SERVICE MANUAL

ERC50 WITH DUAL BASKET LIFTS SHOWN

ER SERIES ELECTRIC FRYERS WITH TRIDELTA CONTROLS

MODEL	ML
ERD50	135541
ERD85	135543
ERC50	135545
ERC85	135547
ERD50F	135561
ERD85F	135563
ERC50F	135565
ERC85F	135567
ERO15	135548
ERO21	135549

- NOTICE -

This Manual is prepared for the use of trained Vulcan Service Technicians and should not be used by those not properly qualified. If you have attended a Vulcan Service School for this product, you may be qualified to perform all the procedures described in this manual.

This manual is not intended to be all encompassing. If you have not attended a Vulcan Service School for this product, you should read, in its entirety, the repair procedure you wish to perform to determine if you have the necessary tools, instruments and skills required to perform the procedure. Procedures for which you do not have the necessary tools, instruments and skills should be performed by a trained Vulcan Service Technician.

For additional information on Vulcan-Hart Company or to locate an authorized parts and service provider in your area, visit our website at www.vulcanhart.com.

A product of VULCAN-HART LOUISVILLE, KY 40201-0696

F35613 (September 2003)

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GENERAL

INTRODUCTION

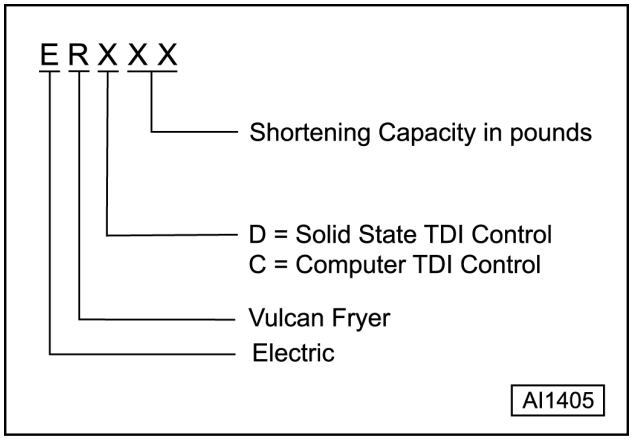
This Service Manual covers specific service information related to the models listed on the front cover. Current production model fryers are built using a solid state control and computer control from Tridelta Industries (TDI).

SINGLE FLOOR MODEL FRYERS

Fryers with the Filter-Ready option installed, use the Mobile Filter. For service information related to the Mobile filter, refer to F24599 MOBILE FILTERS.

An ERO Frymate (dump station) can be configured in a battery with fryers 15 1/2 inches or 21 inches in width.

Model Designations



Models, Features and Options

MODEL	FEATURES					OPTIONS
	FRYER WIDTH (INCHES)	SHORTENING CAPACITY (POUNDS)	FRY TANK	COOKING CONTROL	COOK TIMER (MM:SS)	AUTOMATIC BASKET LIFTS
ERD50	15 1/2	45-50	Full	Solid State	0-99:59	Single or Dual
ERD85	21	85-90	Full	Solid State	0-99:59	Single or Dual
ERC50	15 1/2	45-50	Full	Computer	0-99:59	Single or Dual
ERC85	21	85-90	Full	Computer	0-99:59	Single or Dual
ERO15 (Frymate)	15 1/2					
ERO21 (Frymate)	21					

KLEENSCREEN FILTERING SYSTEM

The Kleenscreen filtering system has been integrated into the ER Series fryer battery. The filter is housed in a pull-out drawer assembly at the base of the fryer. The filtering components in the drawer include a stainless steel filter tank, crumb-catch basket and a dual element mesh filter screen. With the filter drawer closed, a self-seating oil return line provides the path to return the filtered shortening to the fry tank.

This system is designed to provide a thorough and easy method for filtering shortening.

Some of the benefits include:

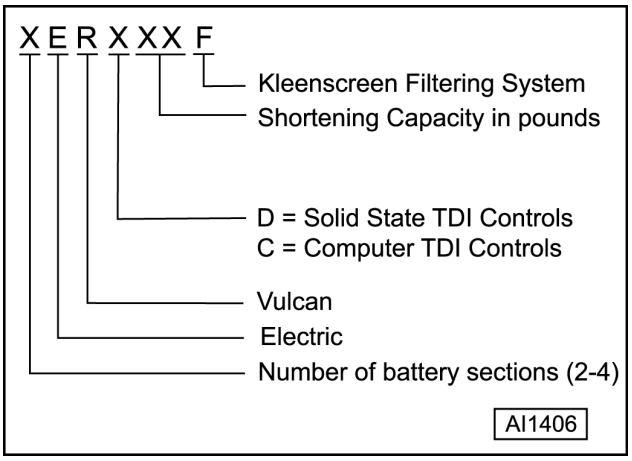
- Self-contained system eliminating the use of external filter equipment.
- Paperless filtering system.
- Easy to clean and low maintenance.

The fryer battery still utilizes many of the same components as the Vulcan ER series fryers.

Kleenscreen fryer batteries are available in a minimum of two and a maximum of four fryer sections. The fryer size of each section is identical.

An ERO Frymate (dump station) can be included as one of the sections.

Model Designations



Models, Features and Options

MODEL	FEATURES						OPTIONS
	FRYER WIDTH (INCHES)	FRYING OIL CAPACITY PER FRYER (POUNDS)	FILTER PAN CAPACITY (POUNDS)	FRY TANK	COOKING CONTROL	COOK TIMER (MM:SS)	AUTOMATIC BASKET LIFTS
2ERD50F [1]	42	45-50	130	Full	Solid State	0-99:59	Single or Dual
2ERD85F [2]	42	85-90	130	Full	Solid State	0-99:59	Single or Dual
2ERC50F [1]	31	45-50	130	Full	Computer	0-99:59	Single or Dual
2ERC85F [2]	42	85-90	130	Full	Computer	0-99:59	Single or Dual
ERO15 (Frymate)	15 1/2						
ERO21 (Frymate)	21						
NOTES:	1. For each additional fryer section, add 15 1/2 inches to the width. 2. For each additional fryer section, add 21 inches to the width.						

SPECIFICATIONS

MODEL	KW PER FRYER SECTION [2]	AMPS - EACH FRYER SECTION (3 PHASE/ 60HZ) [1]		
		PER LINE		
		208V	240V	480V
ERD50,	14	39	34	17
ERD50F	17	47	41	20
ERD85, ERD85F	24	67	58	29
ERC50,	14	39	34	17
ERC50F	17	47	41	20
ERC85, ERC85F	24	67	58	29
NOTES:	1. Amperage values in the table are nominal. Tolerance is +5/-10%. 2. 14kw is standard on all fryers except 85 lb. models which are 24kw.			

Single Floor Model Fryers

- Fryers with the Filter-Ready option installed, use a 120VAC power cord for the Mobile Filter.
- 208VAC, 240VAC or 480VAC (3 phase, 60HZ) to power the heating elements.

Kleenscreen Filtering System

Separate electrical connections are required for each section of the battery.

- 208VAC, 240VAC or 480VAC (3 phase, 60HZ) to power the heating elements.
- On 208VAC and 240VAC models, a transformer provides power for the fryer controls, basket lift(s) if installed, and Kleenscreen filtering controls.
- On 480VAC models, a 120VAC connection is required for each fryer section.
- All models require a separate 120VAC connection for the pump motor (5.0 amp draw).

TOOLS

Standard

- Standard set of hand tools.
- VOM with AC current tester.

  NOTE: Any quality VOM with a sensitivity of 20,000 ohms per volt can be used.
- Temperature tester (thermocouple type).

Special

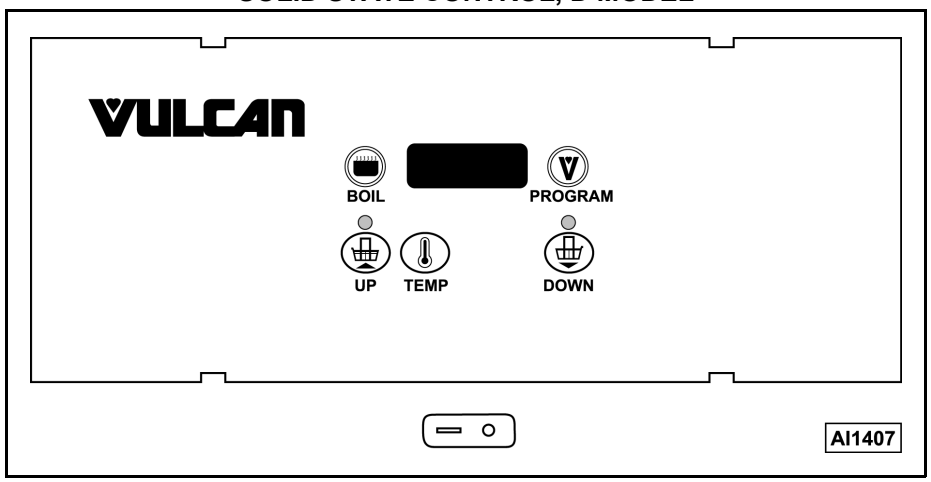
- Field service grounding kit P/N TL- 84919.
- Loctite 242 P/N 520228 or equivalent.
- Burndy pin extraction tool RX2025 GE1; Newark Electronics Catalog Number 16F6666. Used for removing pin terminals on Burndy connectors.

CONTROL PANELS

Solid State

- Five product/programming keys: Left basket (up arrow); Right basket (down arrow); Temperature; Program and Boil.
- Four digit display window that indicates fryer status, time left to cook, and actual or set point temperature. Decimal point of first character indicates heat on when lit.
- Two LED lamps that illuminate when a basket timer is being programmed or blink to when a timer is activated (left or right basket).
- Boil key for automatic or manual mode BOIL out cleaning of fry tank.

SOLID STATE CONTROL, D MODEL

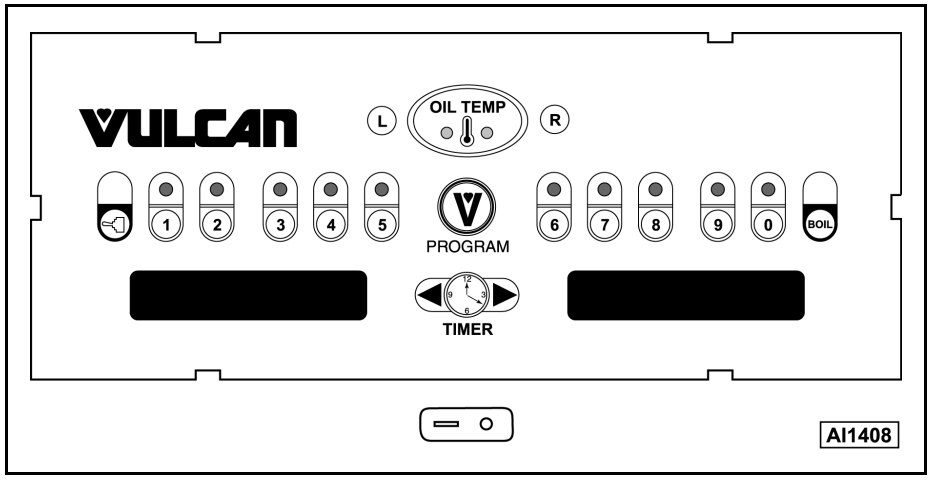


Computer

- Eighteen product/programming keys allow individual product cooking times for up to ten different products: Product/Programming keys 1 thru 0; Oil Temp to view actual temperature or set the desired product cooking temperature; L & R (Left & Right) basket selection; Toggle; Boil; and two Timer keys.

  Left & Right Arrows - used to initiate programming of time and checking stored values (left 1-5 & right 6-0).
- Left & Right displays that indicate actual or set point temperature, remaining times, operating mode, and completion of preheat period.
- Two LED lamps on the OIL TEMP key that indicate heat on and ten individual LED lamps above each of the ten product/programming keys: LED's blink when a product key is activated, solid when using a key for programming.
- Boil key for automatic or manual mode BOIL out cleaning of fry tank.

COMPUTER CONTROL, C MODEL



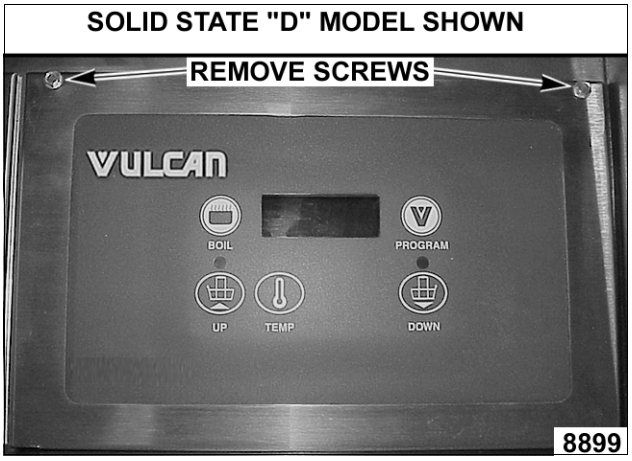
REMOVAL AND REPLACEMENT OF PARTS

COVERS AND PANELS

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AND FOLLOW LOCKOUT / TAGOUT PROCEDURES. THERE MAY BE MULTIPLE CIRCUITS. BE SURE ALL CIRCUITS ARE DISCONNECTED.

Control Panel

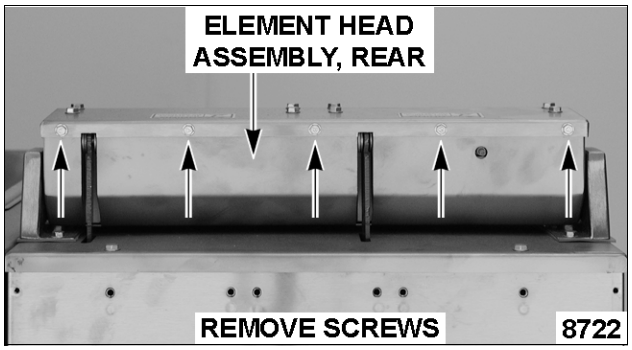
1. Remove screws at top of control panel and lower panel.



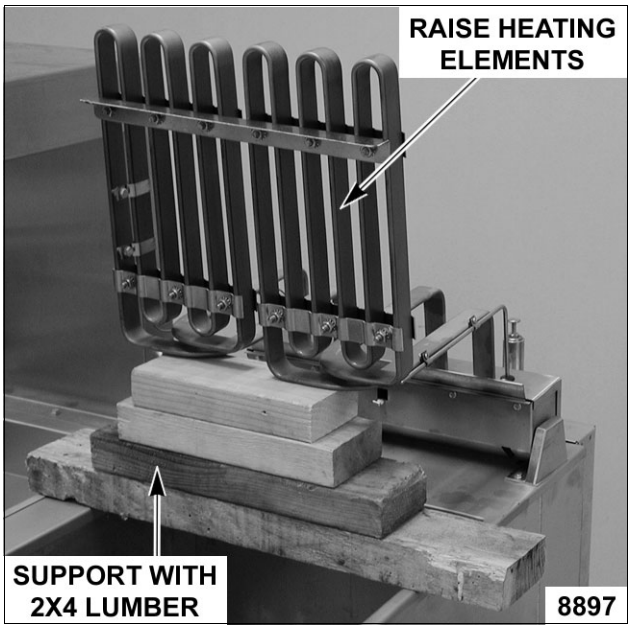
2. Disconnect wiring harness then remove control panel.
3. Reverse procedure to install.

Element Head Cover

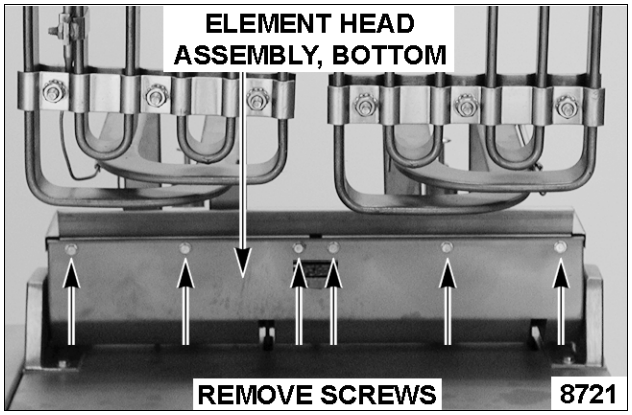
1. Remove basket hanger or lift arm(s) if basket lift option is installed.
2. Remove screws from rear of element head assembly.



3. Raise heating elements and place 2x4 lumber under them for support.



4. Remove screws from the bottom of element head assembly.



5. Grasp heating elements and remove 2x4 lumber. Lift the elements and pull toward rear of fryer. Head cover will separate from element head base.
   A. Lower the heating elements and place them in fry tank.

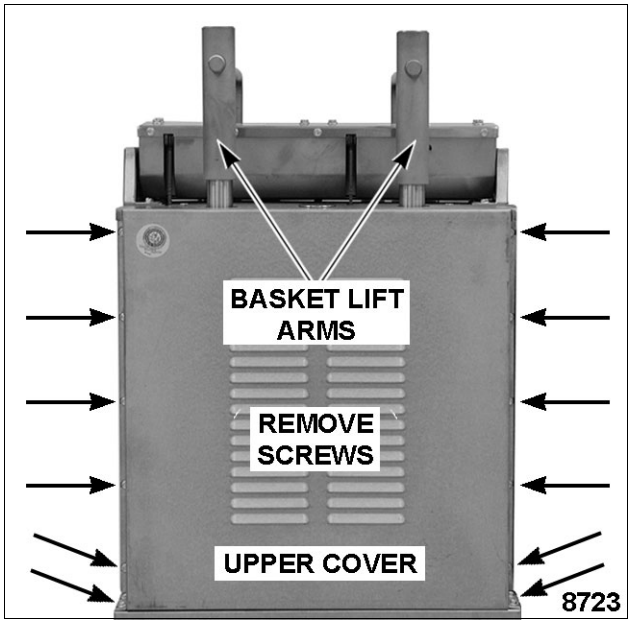
NOTE: Heating elements remain attached to element head cover.

6. Reverse procedure to install.

Basket Lift Covers

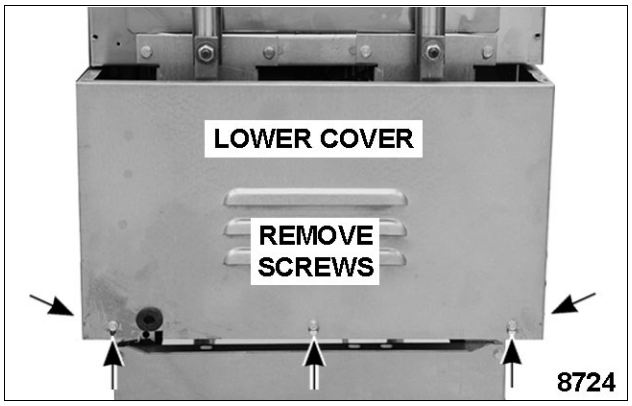
NOTE: Applies to fryers with basket lift option only.

1. Access rear of fryer.
2. Remove basket lift arms from lift tubes.
3. Remove screws securing upper cover to fryer.



A. Lift the upper cover over support rods to remove.

4. Remove screws securing lower cover to motor mounting base.



5. Reverse procedure to install.

Rear Door (Access Cover)

1. Access rear of fryer.
2. Remove basket lift covers if basket lift option is installed.
3. Remove access cover at the top.

NOTE: The cover is flanged at the top & bottom and is held in place by an interference fit. The bottom flange is formed to secure the cover to fryer.

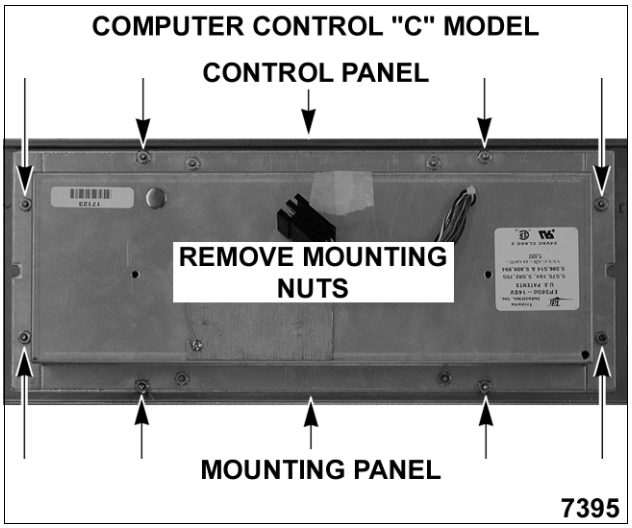
4. Reverse procedure to install.

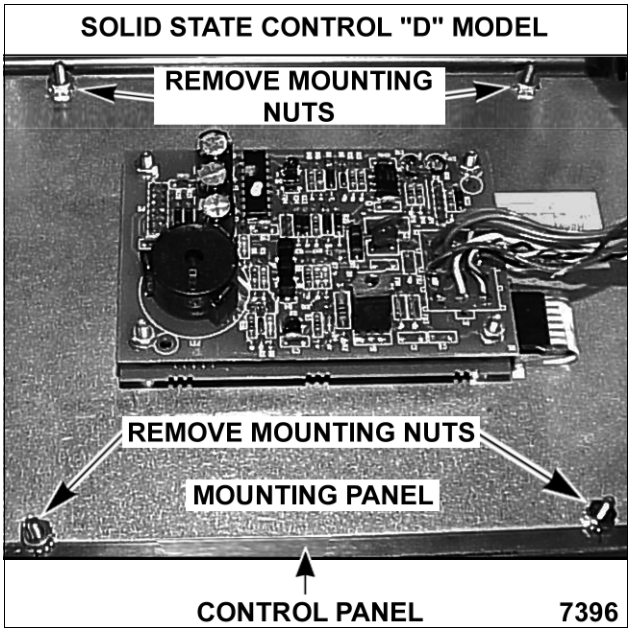
COOKING CONTROLS

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AND FOLLOW LOCKOUT / TAGOUT PROCEDURES. THERE MAY BE MULTIPLE CIRCUITS. BE SURE ALL CIRCUITS ARE DISCONNECTED.

CAUTION: Certain components in this system are subject to damage by electrostatic discharge during field repairs. A field service ground kit is available to prevent damage. The field service grounding kit must be used anytime the control board is handled.

1. Remove the control panel as outlined under CONTROL PANEL.
2. Remove cooking control by removing mounting nuts securing the control and mounting panel to front control panel.





3. Lift the cooking control with mounting panel attached, off the front control panel.
4. Reverse procedure to install.
5. Re-connect power and turn power switch on.
6. Program the cooking control for the control type as outlined under SOLID STATE CONTROL or COMPUTER CONTROL in SERVICE PROCEDURES AND ADJUSTMENTS.

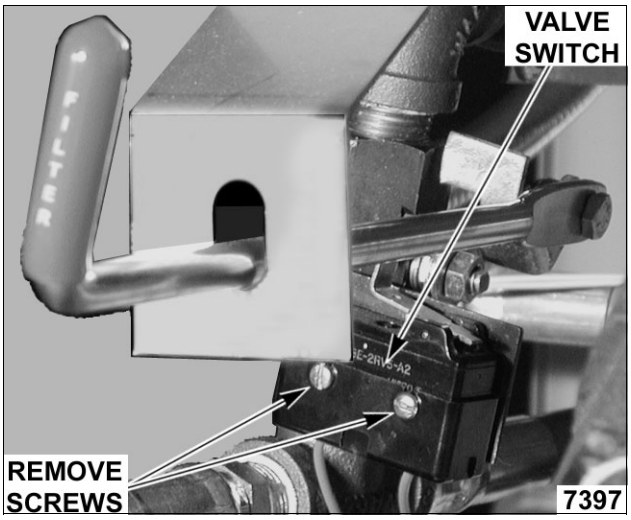
NOTE: If installing a replacement cooking control, program the control with the customers settings and products.

7. Check for proper operation.

FILTER VALVE AND DISCARD VALVE SWITCHES

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AND FOLLOW LOCKOUT / TAGOUT PROCEDURES. THERE MAY BE MULTIPLE CIRCUITS. BE SURE ALL CIRCUITS ARE DISCONNECTED.

1. Open the door to the fryer section being serviced.
2. Disconnect lead wire connector (2 pin) to the switch.
3. Remove switch mounting screws.



4. Remove switch cover and disconnect lead wires from switch.
5. Reverse procedure to install and check for proper operation.

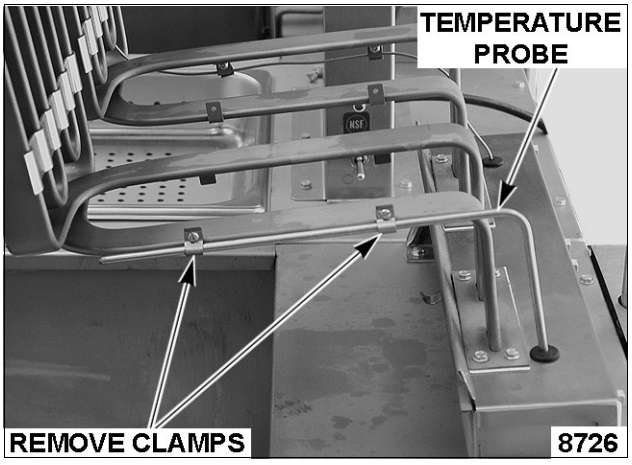
NOTE: Switches are not adjustable.

TEMPERATURE PROBE

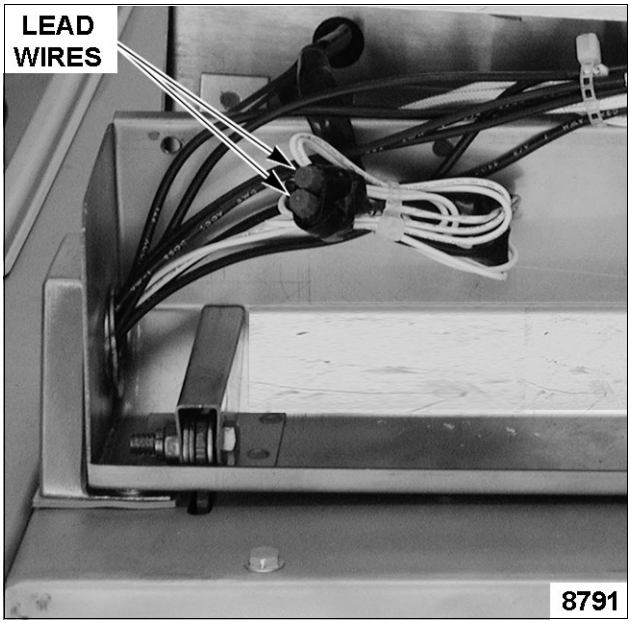
WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AND FOLLOW LOCKOUT / TAGOUT PROCEDURES. THERE MAY BE MULTIPLE CIRCUITS. BE SURE ALL CIRCUITS ARE DISCONNECTED.

CAUTION: Do not sharply bend and kink the temperature probe or damage may occur.

1. Raise heating elements.
2. Remove clamps from temperature probe.



3. Remove element head cover as outlined under COVERS AND PANELS.
4. Disconnect temperature probe lead wires.



5. Remove temperature probe from the element head.
6. Reverse procedure to install.

NOTE: When installing, ensure grommet remains in place when inserting temperature probe thru the grommet in the element head.

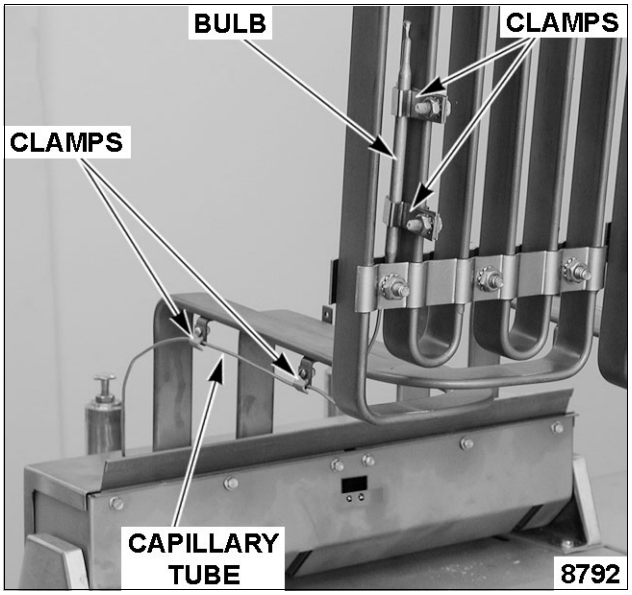
7. Check cooking control calibration as outlined in COOKING CONTROL CALIBRATION under SERVICE PROCEDURES AND ADJUSTMENTS.

HIGH LIMIT THERMOSTAT

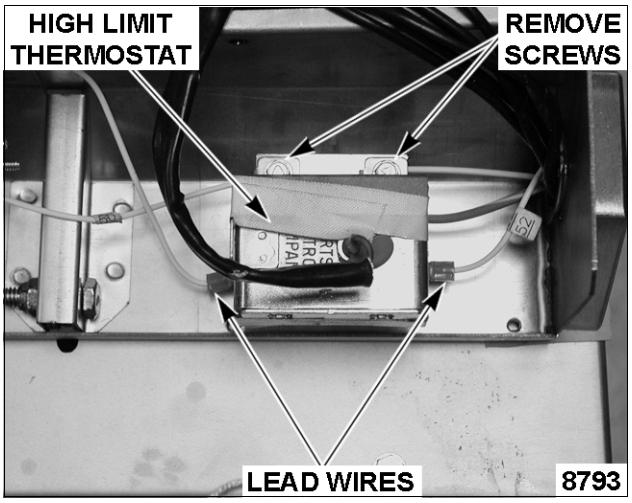
WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AND FOLLOW LOCKOUT / TAGOUT PROCEDURES. THERE MAY BE MULTIPLE CIRCUITS. BE SURE ALL CIRCUITS ARE DISCONNECTED.

CAUTION: Do not sharply bend and kink the capillary tube or damage may occur.

1. Raise heating elements.
2. Loosen clamps securing capillary tube and bulb to element.



3. Remove element head cover as outlined under COVERS AND PANELS.
4. Remove high limit from mounting bracket.
5. Disconnect high limit lead wires.



6. Remove grommet from the element head assembly.
7. Remove the bulb, capillary tube and high limit from the element head assembly.

NOTE: When installing, slide grommet onto capillary tube then insert grommet into the capillary tube thru hole in the element head.

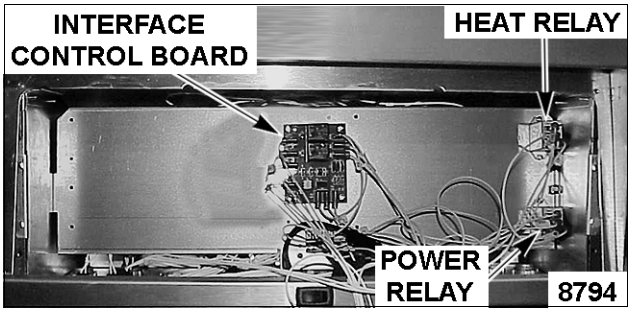
8. Reverse procedure to install.

POWER SUPPLY BOX COMPONENTS

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AND FOLLOW LOCKOUT / TAGOUT PROCEDURES. THERE MAY BE MULTIPLE CIRCUITS. BE SURE ALL CIRCUITS ARE DISCONNECTED.

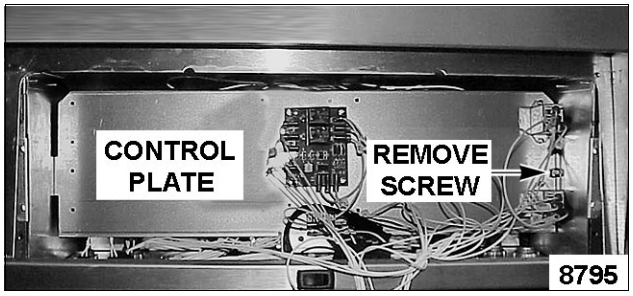
CAUTION: Certain components in this system are subject to damage by electrostatic discharge during field repairs. A field service grounding kit is available to prevent damage. The field service grounding kit must be used anytime a control board is handled.

1. Remove the control panel as outlined under CONTROL PANEL.
2. Disconnect lead wires then remove the component being replaced.



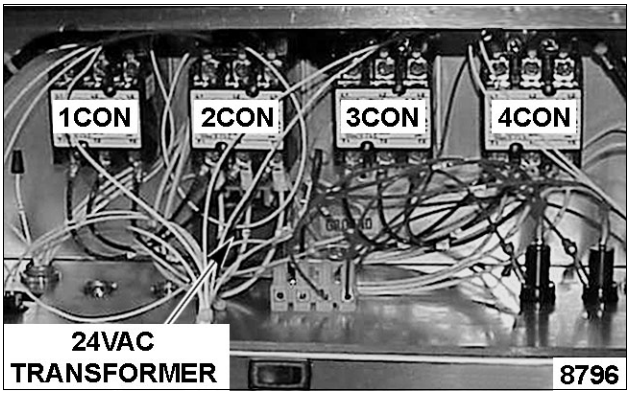
   A. If removing, contactor(s), transformer, or filter relay, continue with procedure.

3. Remove screw securing control plate to box.



   A. Grasp control plate on the right side at the top, and pull out until left side holding tab clears slot.

4. Disconnect lead wires then remove the component being replaced.



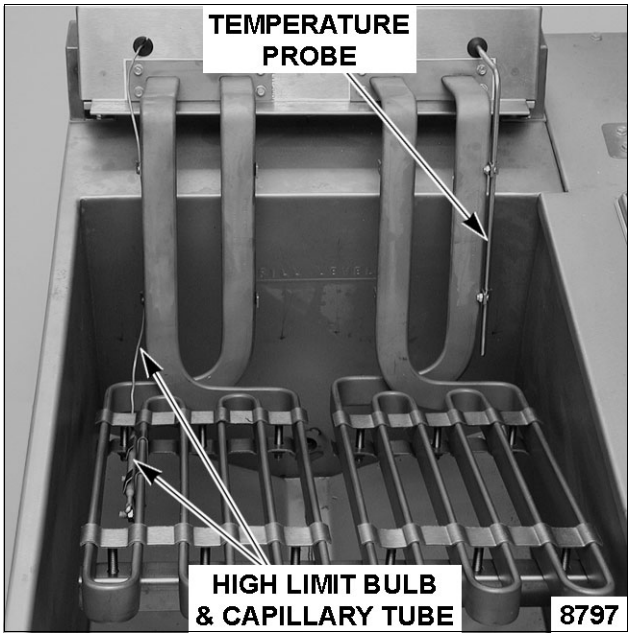
5. Reverse procedure to install the replacement component and check for proper operation.

HEATING ELEMENTS

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AND FOLLOW LOCKOUT / TAGOUT PROCEDURES. THERE MAY BE MULTIPLE CIRCUITS. BE SURE ALL CIRCUITS ARE DISCONNECTED.

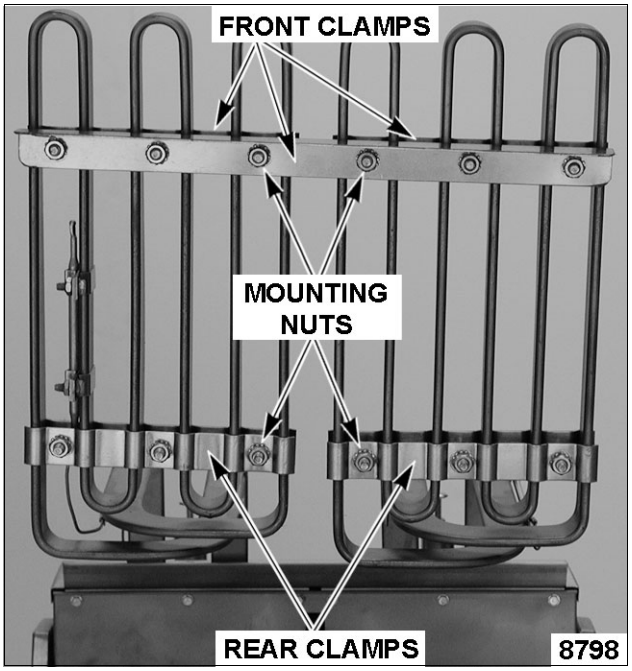
CAUTION: Do not sharply bend and kink the capillary tube or the temperature probe, or damage may occur.

1. Remove basket hanger or lift arm(s) if basket lift option is installed.
2. Raise heating elements.
   A. If replacing left heating element, loosen high limit bulb and capillary tube clamps. Remove high limit bulb and capillary tube from clamps then position away from element.
   B. If replacing right heating element, remove temperature probe clamps and position temperature probe away from element.



NOTE: When installing high limit, route the capillary tube and center the bulb between the clamps before tightening.

3. Remove element assembly clamps. Front clamps stiffen and secure both elements together. Rear clamps stiffen each individual element.

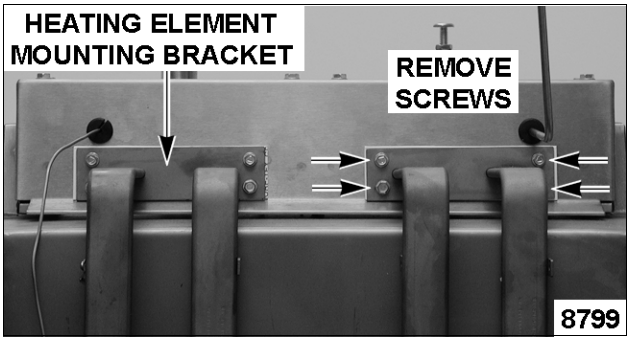


4. Remove element head cover as outlined under COVERS AND PANELS.

5. Disconnect heating element lead wires.

NOTE: Each heating element assembly contains three individual elements (six lead wire connections total).

6. Remove screws from heating element mounting bracket and remove heating element.



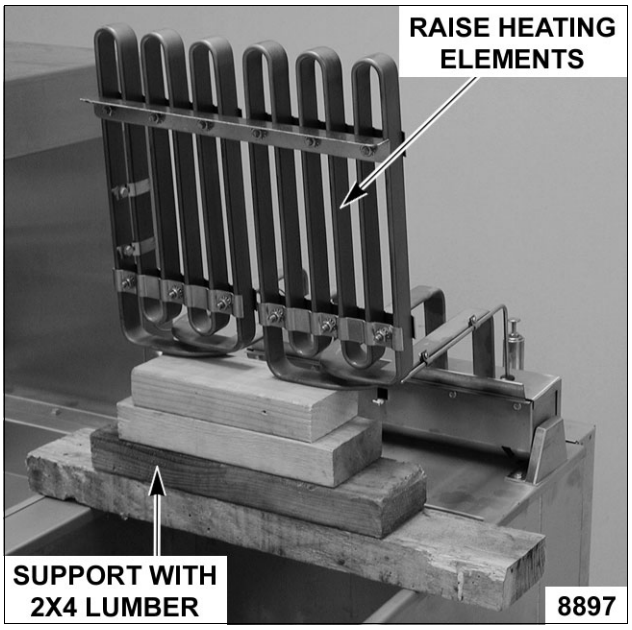
7. Reverse procedure to install.

LIFT ASSIST SPRINGS

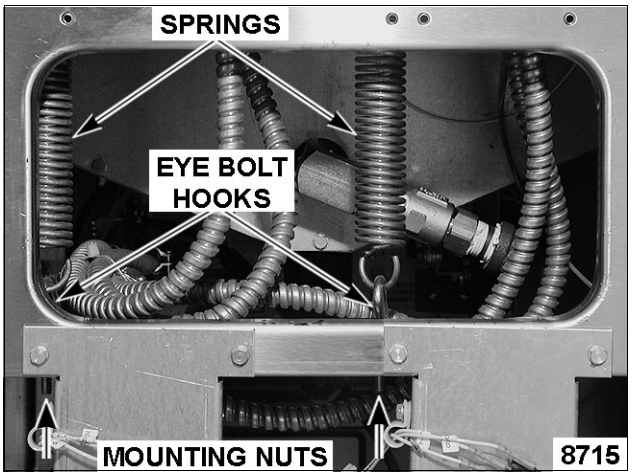
WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AND FOLLOW LOCKOUT / TAGOUT PROCEDURES. THERE MAY BE MULTIPLE CIRCUITS. BE SURE ALL CIRCUITS ARE DISCONNECTED.

1. Remove rear door (access cover) as outlined under COVERS AND PANELS.

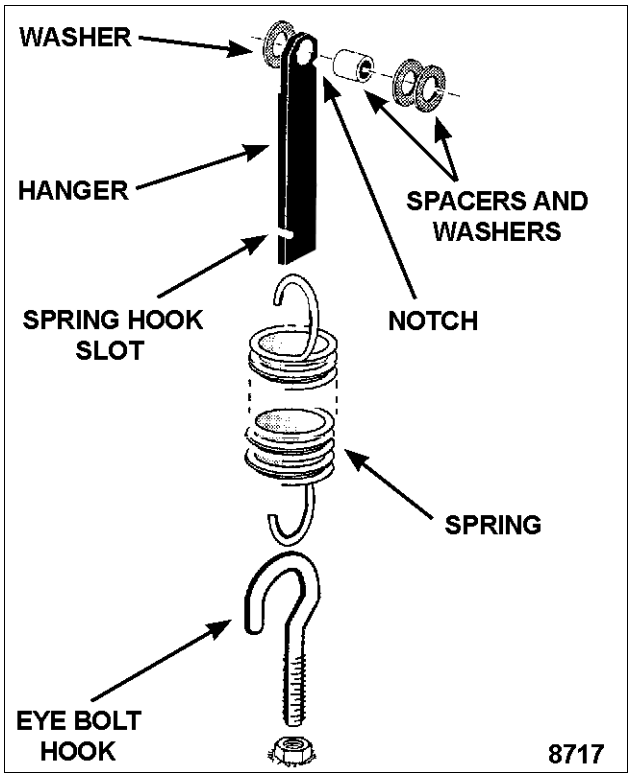
2. Raise heating elements and place 2x4 lumber under them for support. Heating elements are to remain upright.



3. Loosen all eye bolt mounting nuts to release tension on springs.



4. Remove lift assist springs from the eye bolt hooks.
5. Remove lift assist springs from the hangers.
6. To install springs:
   A. Attach spring hook to hanger thru rear door opening.
   B. Attach spring hook to eye bolt and tighten eye bolt mounting nut.

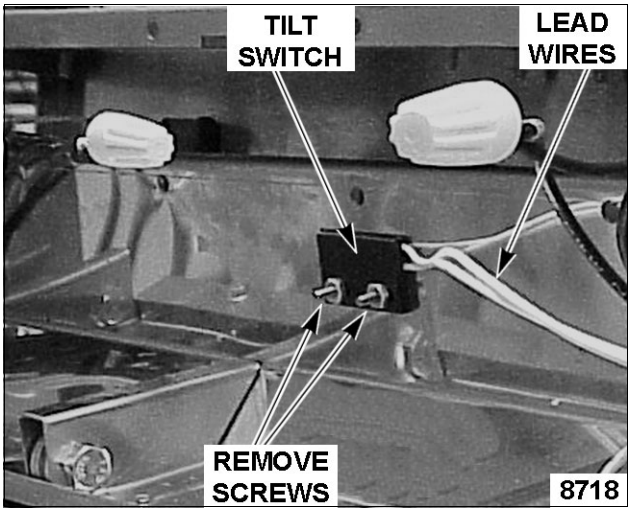


   C. Remove 2x4 lumber and lower heating elements.
7. Adjust spring tension as outlined under LIFT ASSIST SPRING ADJUSTMENT in SERVICE PROCEDURES AND ADJUSTMENTS.

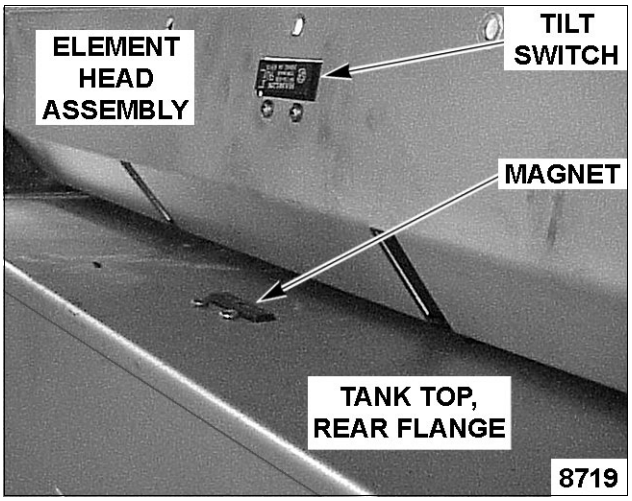
TILT SWITCH

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AND FOLLOW LOCKOUT / TAGOUT PROCEDURES. THERE MAY BE MULTIPLE CIRCUITS. BE SURE ALL CIRCUITS ARE DISCONNECTED.

1. Remove element head cover as outlined under COVERS AND PANELS.
2. Lower heating elements.
3. Disconnect lead wires from tilt switch.
4. Remove tilt switch from element head.



REAR VIEW SHOWN, ELEMENTS LOWERED



FRONT VIEW SHOWN, ELEMENTS RAISED

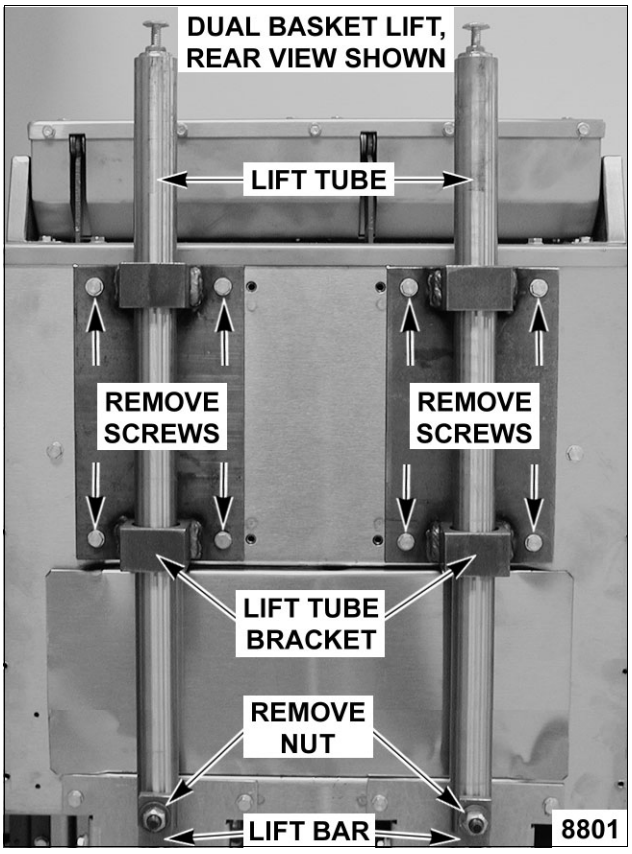
5. Reverse procedure to install and check for proper operation.

NOTE: The tilt switch and magnet are mounted in fixed locations and are not adjustable.

BASKET LIFT TUBE

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AND FOLLOW LOCKOUT / TAGOUT PROCEDURES. THERE MAY BE MULTIPLE CIRCUITS. BE SURE ALL CIRCUITS ARE DISCONNECTED.

1. Remove basket lift covers as outlined under COVERS AND PANELS.
2. Remove nut securing lift bar to the lift tube.
3. Remove screws securing lift tube bracket to fryer then remove bracket and lift tube.

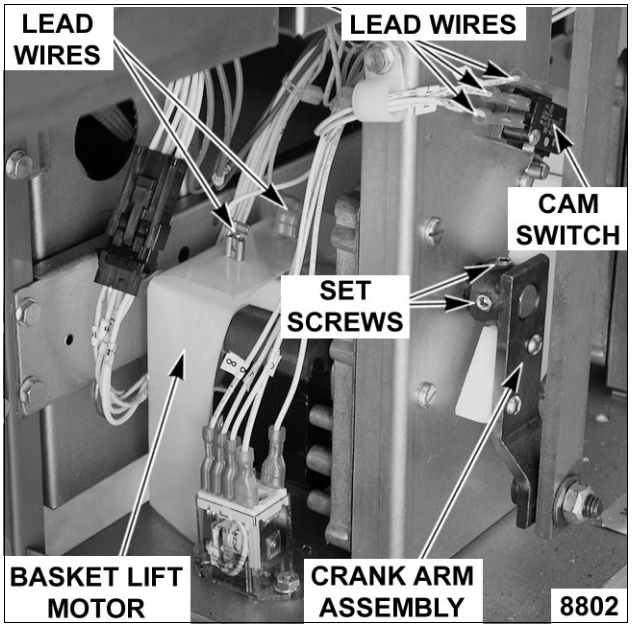


4. Reverse procedure to install.

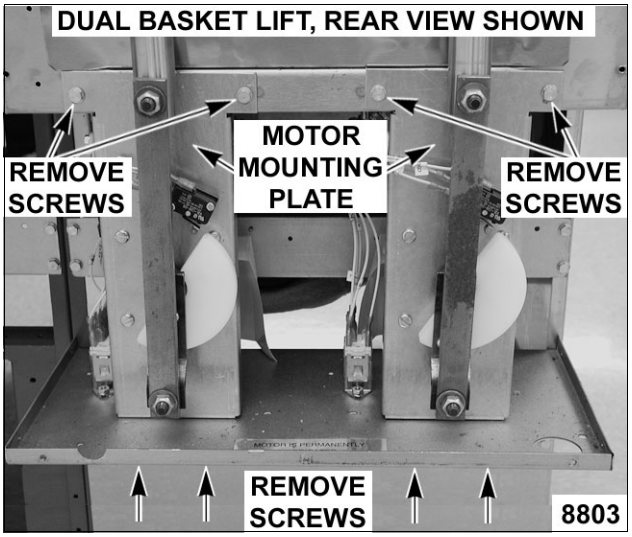
BASKET LIFT MOTOR

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AND FOLLOW LOCKOUT / TAGOUT PROCEDURES. THERE MAY BE MULTIPLE CIRCUITS. BE SURE ALL CIRCUITS ARE DISCONNECTED.

1. Remove basket lift tube as outlined under BASKET LIFT TUBE.
2. Disconnect lead wires from cam switch and basket lift motor.
3. Loosen set screws securing crank arm assembly to the basket lift motor shaft.



4. Remove screws securing motor mounting plate to fryer then remove motor from plate.



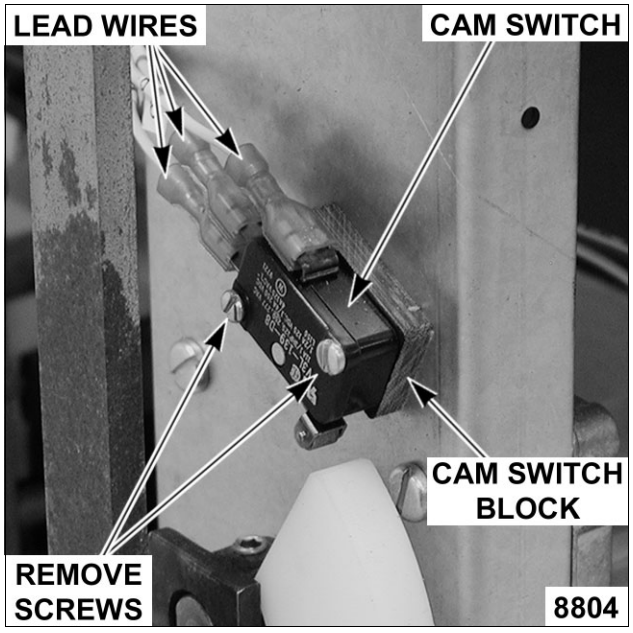
5. Reverse procedure to install and check for proper operation.

NOTE: When installing, keep all lead wires clear from moving parts.

BASKET LIFT CAM SWITCH

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AND FOLLOW LOCKOUT / TAGOUT PROCEDURES. THERE MAY BE MULTIPLE CIRCUITS. BE SURE ALL CIRCUITS ARE DISCONNECTED.

1. Remove basket lift covers as outlined under COVERS AND PANELS.
2. Disconnect lead wires from cam switch.
3. Remove screws securing cam switch to motor mounting plate.



4. Reverse procedure to install and check for proper operation.

NOTE: When installing, place the cam switch block behind the cam switch for proper spacing.

PUMP AND MOTOR

WARNING: DISCONNECT THE ELECTRICAL POWER TO THE MACHINE AND FOLLOW LOCKOUT / TAGOUT PROCEDURES. THERE MAY BE MULTIPLE CIRCUITS. BE SURE ALL CIRCUITS ARE DISCONNECTED.

1. Open both fryer cabinet doors above the filter tank drawer.
2. Pull the filter drawer out and remove splash guard/cover from tank.
   A. If filter tank is not empty, remove shortening from filter tank.
3. Remove the filter tank assembly and push the tank support arms back underneath the fryer.

NOTE: The remaining steps are written for front removal of the pump assembly. If access to the back of the fryer is available, it may be easier to remove the pump from the rear.

4. Disconnect the electrical connection to the motor.
5. Separate the swivel hose connections at the pump.

NOTE: When viewed from pump end, the right side is the intake port and the left side is the discharge port.

6. Remove motor mounting bolts.
7. Remove the motor and pump (pipe fittings attached) from the fryer.
   A. If replacing the pump and motor, remove the existing pipe assemblies and reuse.
8. Reverse procedure to install.

NOTE: Ensure the rubber vibration pad or the grommets are installed under the motor mounting plate.

SERVICE PROCEDURES AND ADJUSTMENTS

WARNING: CERTAIN PROCEDURES IN THIS SECTION REQUIRE ELECTRICAL TEST OR MEASUREMENTS WHILE POWER IS APPLIED TO THE MACHINE. EXERCISE EXTREME CAUTION AT ALL TIMES. IF TEST POINTS ARE NOT EASILY ACCESSIBLE, DISCONNECT POWER AND FOLLOW LOCKOUT / TAGOUT PROCEDURES, ATTACH TEST EQUIPMENT AND REAPPLY POWER TO TEST.

TEMPERATURE PROBE TEST

The temperature probe is used for both the solid state and computer cooking controls. The probe is an RTD (resistance temperature detector) of the thermistor type. As temperature increases the resistance value decreases.

Probe Fault

If a temperature probe fault or high temperature condition occurs, a fault message will be displayed and the electronic alarm will sound continuously. The heat demand and basket lift outputs are de-activated. If a cooking cycle is in process (timer active), it will be cancelled and the key pad disabled.

This will continue until the fault clears, power is cycled or problem resolved.

Cooking Control	Display Message
SOLID STATE	An open will display Prob and a short or high temperature condition will display HI.
COMPUTER	An open will display PROBE OPEN and a short or high temperature condition will display PROBE SHORT.

To Check:

1. Turn power switch off.
2. Remove CONTROL PANEL as outlined under COVERS AND PANELS.
3. Test the probe using a VOM to measure resistance. Connect the meter probe leads to pins 3 & 4 on the female connector for the wiring harness.
   A. If the measured resistance values are within the allowable range, the probe is functioning properly. Reverse procedure to install.
   B. If the measured resistance values are outside the allowable range, install a replacement probe as outlined under TEMPERATURE PROBE in REMOVAL AND REPLACEMENT OF PARTS.
   C. Check cooking control calibration.

Temperature (ºF)	Resistance (Ω)
77	90,000 - 110,000
350	604 - 836
415 [1]	302 - 369
460 [2]	191 - 233

NOTE: 1. High temperature alarm level for the cooking controls.
2. Shorted probe equivalent temperature.

COOKING CONTROL CALIBRATION

NOTE: Verify condition of temperature probe as outlined under TEMPERATURE PROBE TEST before proceeding.

1. Check the level of shortening in fry tank. The level must be between the MIN & MAX fill lines before proceeding.
2. Allow the shortening to cool below 300°F.
3. Place a thermocouple in the geometric center of the fry tank one inch below the shortening surface.
4. Set the cooking control to 350°F and turn the fryer on.
5. Monitor the heat indicator lamp. When cooking control is calling for heat, lamp will be on. If cooking control is satisfied, lamp will be off.

   Solid State Control - Decimal point of first character indicates heat on when lit.

   Computer Control - Two LED lamps on the oil temp key that indicate heat on.

NOTE: Agitate the shortening, to eliminate any cold zones.

   A. Allow cooking control to cycle three times to stabilize shortening temperature.
   B. Record meter reading from thermocouple when the cooking control cycles off and on for at least two complete heating cycles.

6. Calculate the average temperature by adding the temperature reading when the heat lamp goes out to the temperature reading when the heat lamp comes on & divide this answer by 2.

[Temp. (Lamp off) + Temp. (lamp on)] ÷ 2 = Average Temp.

Example: 360˚ + 340˚ ÷ 2 = 350˚F.

The average temperature should be 350°F (± 5°F).

A. If the average temperature reading is within tolerance, cooking control is properly calibrated.

B. If the average temperature reading is out of tolerance, perform the following:

1) Solid State Control - Adjust the offset temperature accordingly as outlined in SOLID STATE CONTROL under SERVICE PROCEDURES and ADJUSTMENTS.

2) Computer Control - Adjust the offset temperature accordingly as outlined in COMPUTER CONTROL under SERVICE PROCEDURES and ADJUSTMENTS.

7. Repeat the average temperature calculation for up to three attempts. Allow the cooking control to cycle at least two times between adjustments before performing the calculation.

8. If calibration is unsuccessful, the cooking control may be malfunctioning and cannot be adjusted properly. Install a replacement cooking control and check calibration.

LIFT ASSIST SPRING ADJUSTMENT

1. Turn power switch off.

2. Remove lift arm(s) if basket lift option is installed.

3. Check spring tension:

A. Raise heating elements to the full up position. Elements should remain in place.

B. Lower heating elements to the full down position. Elements should remain in place.

C. If the elements remain in place as described, then no adjustment is necessary. If the elements do not remain in place, continue with procedure for adjustment.

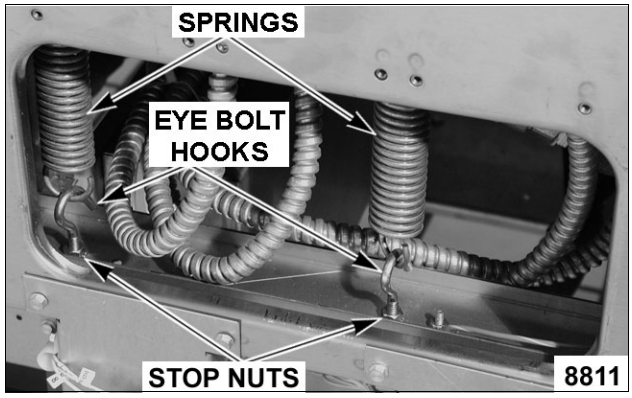
4. Remove basket lift tube(s) if basket lift option is installed as outlined under BASKET LIFT TUBE in REMOVAL AND REPLACEMENT OF PARTS.

5. Remove rear door (access cover).

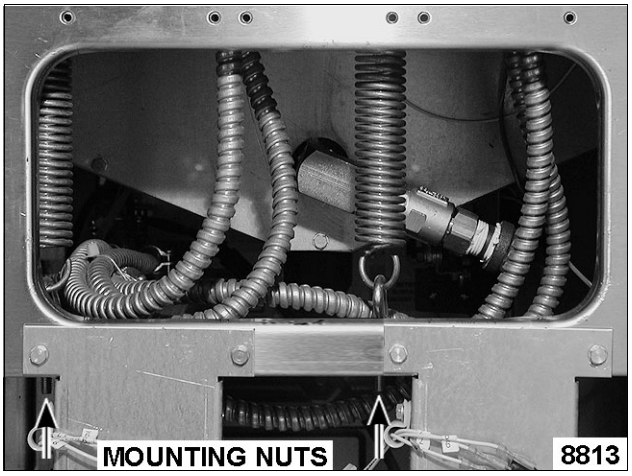
NOTE: Elements should be in the down position.

6. To adjust spring tension:

A. Loosen stop nut on all eye bolts.



B. Adjust eye bolt mounting nuts as necessary, but equally on all springs to achieve the best spring tension to hold elements in place.



C. Perform spring tension check.

D. Repeat spring tension adjustment if necessary.

E. Tighten stop nut on all eye bolts.

7. Replace rear door (access cover) and basket lift components (if installed).

BASKET LIFT ARM ADJUSTMENT

1. With shortening at room temperature, verify the level is between MIN & MAX lines in fry tank. Add shortening as needed.

NOTE: Shortening will expand when heated. Do not fill the fry tank past the MAX line.

2. Turn power switch on and set temperature to 350˚F. Allow the shortening to reach set temperature.

3. Check basket lift operation.

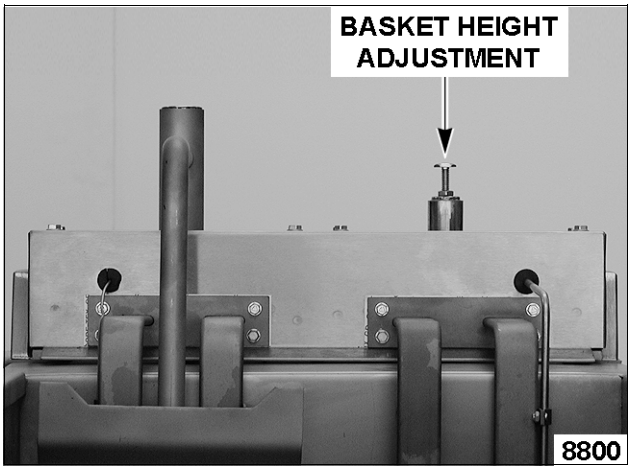
A. If necessary, adjust as outlined below.

4. When basket is in the up position, the bottom of the basket should be out of the shortening. When basket is in the down position, the bottom of the basket should clear the crumb screen and the product should be submerged.

   A. To adjust, remove basket arm from lift shaft, loosen stop nut and turn height adjustment bolt to raise or lower basket arm as required. Both baskets should be same height.

   B. Re-tighten stop nut when complete.

NOTE: If adjustment is to low, when the basket is lowered, it will disengage from basket arm.



HEATING ELEMENT TEST

VOLTAGE	TOTAL KW	AMPS PER ELEMENT	OHMS PER ELEMENT
208	14	39	18.3
	17	47	15.2
	24	67	10.7
240	14	34	24.2
	17	41	20.4
	24	58	14.2
480	14	17	97.6
	17	20	83.0
	24	29	57.4

NOTES:
1. Values in the table are nominal. Tolerance is +5/-10%.
2. Voltage values are @ 60HZ.
3. Resistance values (ohms) are @ room temperature.

1. Remove element head cover as outlined under COVERS AND PANELS in REMOVAL AND REPLACEMENT OF PARTS.

CAUTION: Heating elements must remain submerged in shortening while performing this test or damage may occur.

2. Access heating element lead wire connections at wire nuts.

3. Re-connect power, turn power switch on and set cooking control to call for heat.

4. Measure voltage at heating element connections and verify against data plate voltage.

   A. If voltage is incorrect, see ALL MODELS under TROUBLESHOOTING.

   B. If voltage is correct, check current draw (amps) through the heating element lead wires. See table for proper values.

   NOTE: This method is preferred over a resistance check when a clamp on type amp meter is available.

      1) If current draw is correct then heating element is functioning properly.

      2) If current draw is not correct, turn power switch off and disconnect power to the machine.

         a. Install a replacement heating element.

         b. Proceed to last step.

   C. If unable to check current draw, a resistance check may indicate a malfunctioning element. See table for proper values.

      1) Turn power switch off and disconnect power to the machine.

      2) Remove wire nuts from heating element lead wire connections and separate lead wires.

      3) Check resistance (ohms).

5. Check for proper operation.

SOLID STATE CONTROL

Operation

Refer to the Installation & Operations manual for specific operating instructions.

Error messages

For information on solid state control error messages, refer to SOLID STATE CONTROL under TROUBLESHOOTING.

Programming

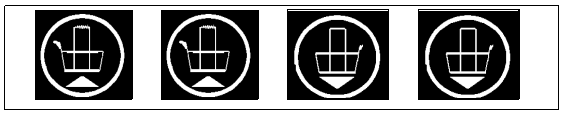
The solid state control's programming mode is used to set the controls operational parameters.

NOTE: If a product key is active (timing), programming mode can not be entered.

1. Press V key to enter programming mode.

   If the PARAMETER LOCK feature is disabled, PROGRAM MODE entry is immediate. If the PARAMETER LOCK feature is enabled LoC will be displayed.

   Use the following key sequence (password) to enter PROGRAM MODE: LEFT BASKET/UP; LEFT BASKET/UP; RIGHT BASKET/DOWN; RIGHT BASKET/DOWN.



   NOTE: If the proper key sequence is not entered within 6 seconds the control exits PROGRAM MODE.

2. Beeper chirp's on each successful keypress; If a key is not pressed within 2 minutes, the control will automatically exit programming.
3. To scroll through each of the PROGRAM ITEMS, press V and release.
4. To exit PROGRAM MODE, at any time, press V and hold for 1 second.

PROGRAM ITEM	KEY SEQUENCE	DISPLAY [5]
Left Timer	• Press Left Basket to increase or Right Basket to decrease cook time. [1]	LED above left basket is on. **15:00** time value with flashing colon (MM:SS).
Right Timer	• Press Left Basket to increase or Right Basket to decrease cook time. [1]	LED above right basket is on. **15:00** time value with flashing colon (MM:SS).
Set point Temperature	• Press Left Basket to increase or Right Basket to decrease set point temperature. [2]	**340F** or 171C current set point with flashing F or C
Calibration Offset	• Press Left Basket to increase or Right Basket to decrease offset temperature. [2, 3]	**00F** OR -00F always in ˚F
Melt Options	• Press Left Basket or Right Basket to scroll thru Melt Options.	**CY L** CY L = Liquid CY S = Solid CY 0 = No
Energy Source	• Press Left Basket or Right Basket to select the fryer's energy source, electric or gas heat.	**ELEC** or gAS
Parameter Lock	• Press Left Basket or Right Basket to select desired Parameter Lock Condition. [4]	**Uloc** or LoC selected parameter is enabled if flashing
Degrees F or C	• Press Left Basket or Right Basket to select desired Temperature Scale.	**F** or C
NOTES:	1. Time will change in one second increments, accelerating if the button is held. 2. Temperature will change in one degree increments, accelerating if the button is held. 3. Range -20 to +20, default = 0 (˚F). 4. Selecting Parameter Lock enabled will take effect on the next Program Mode entry. 5. Default value shown in bold.	

COMPUTER CONTROL

Operation

Refer to the Installation & Operations manual for specific operating instructions.

Service Programming

The computer control's service programming mode is used to perform system diagnostic tests or edit program items that affect the fryers operation.

NOTE: If a product key is active (timing), service programming can not be entered.

Error messages

For information on computer control error messages, refer to COMPUTER CONTROL under TROUBLESHOOTING.

Enter Service Mode

1. Press V key and enter password (default, 1972); Use product key numbers (1 thru 0) to enter values.
   A. SERVICE is displayed in left window & the LED's above product key's 1, 2, 4, 5, 6, 7 & 8 come on.
   B. Beeper chirp's on each successful keypress; If a key is not pressed within 2 minutes, the computer will automatically exit service programming (except in diagnostic mode).
2. To exit a PROGRAM ITEM after making a selection, press V to accept and return to service programming.
3. To exit SERVICE PROGRAMMING and return to operation mode, press V key twice.

PROGRAM ITEM	KEY SEQUENCE	LED STATUS		DISPLAY [8]	
		ON	OFF	LEFT	RIGHT
Temperature Offset	• Press 1 and enter desired offset temperature • Press V to accept selection • Press TOGGLE to display direction of offset (positive or negative)		all	OFF **00** F POSITIVE OR NEGATIVE	DEGREES DEGREES
Melt Cycle On/Off Times	• Press 2 and set melt cycle on time [7] • Press LEFT OR RIGHT TIMER key arrow and set melt off time		all	MLTON:**04** MLTOFF:**11**	MELT ON MELT OFF
Diagnostic Mode	• Press 5 to enter diagnostic mode (outputs for heat, basket lift(s) and cooking timers turned off)	5, 7		DIAGNOST	DIAGNOST
	• Press 1 to toggle left basket lift output; left basket lift lowers. LED toggles on/off.	5, 7		L BASKET	L BASKET
	• Press 2 to toggle right basket lift output; right basket lift lowers. LED toggles on/off.	5, 7		R BASKET	R BASKET
	• Press 3 and hold to temporarily activate heat demand (heat on); release to de-activate heat demand (heat off). LED toggles on/off. [1]	5, 7		HEAT DEM	HEAT DEM
	• Press 5 to test drain valve interlock	5, 7			
	- If drain valve closed	5, 7		DRN ON	DRN ON
	- If drain valve open	7	5	DRN OFF	DRN OFF
	• Press 6 and hold to light all display elements	all		✳.✳.✳.✳.✳.✳'✳'✳	✳.✳.✳.✳.✳.✳'✳'✳
Temperature Ready Level	• Press 6 to view the cooking cycle lock out temperature (always ˚F). To edit, enter the 2-digit number desired. [2]		all	READY**40**F	

Service Programming, continued on next page

PROGRAM ITEM	KEY SEQUENCE	LED STATUS		DISPLAY [8]	
		ON	OFF	LEFT	RIGHT
More Service Programming Level	• Press 8 to enter the More Service Programming. To edit one of the selections, enter the 2-digit number desired. To exit a selection, press V to accept & return to More Service Programming.	4, 5, 6, 7, 8		MORE	SERVICE
	• Press 4 to view or edit the Shake Alarm duration: 0-98 seconds; 99 - continuous alarm until cancelled manually.			DT-DUR**13**	DURATION
	• Press 5 to view or edit the Hold Alarm duration: 0-98 seconds; 99 - continuous alarm until cancelled manually.			HD-DUR.˙**05**	DURATION
	• Press 6 to view or edit the Cooking cycle cancel delay; 0-10 seconds. [3]			CANCEL.˙**01**	DELAY
	• Press 7 to view or edit the number of basket lifts: 0 = none; 1 = one lift; 2 = two lifts. [4, 5]		all	LIFTS	**0**, 1 or 2
	• Press 8 to view or edit the fryer's Energy Source, electric or gas heat. [5, 6]		all	FRYER	**ELECTRIC** or gAS
NOTES:	1. Oil temp LED's cycle on/off with heat. 2. If the cooking temperature is below set point by this number, a cooking cycle can not be started. 3. The number of seconds to hold a product key during a cooking cycle to cancel it. 4. If zero basket lifts are selected, the idle setback option under ERC SERIES PROGRAMMING in the Installation and Operation manual is not available. 5. Exit Service Programming Mode. Cycle power switch to lock selection into memory. 6. Pressing V to accept selection returns menu to Operator Programming & not More Service Programming. Enter Service Programming Mode again, to make additional selections. 7. Default melt cycle on/off times shown for liquid shortening (default shortening type). 8. Default value shown in bold.				

Display, Led and Keypad Test

1. Press and hold the 5 key while turning power on to Initiate test. Release the 5 key during display of software revision level.
2. For each number key (1-9, & 0) pressed, the corresponding value is displayed in each character position on the left and right display.

   (i.e. 5 key shows 55555555 55555555).

NOTE: Beeper chirp's for as long as key is held.

3. For each function key pressed, the following values are displayed in each character position on the left and right display:

   - PROGRAM (V): V
   - TEMPERATURE: T
   - TOGGLE: L
   - BOIL: B
   - LEFT TIME: <
   - RIGHT TIME: >

4. Turn power off to exit test.

ELECTRICAL OPERATION

COMPONENT FUNCTION

FRYER CONTROLS

Solid State or Computer Cooking Controls (D or C Models) . . . . . . Controls fryer operation: Maintains shortening temperature, counts product cook time(s) and signals the electronic alarm at the end of a cooking cycle. If fryer is equipped with basket lift(s), controls the basket lift(s) operation.

Note: By utilizing the same wiring harness connections, the two control types are interchangeable between fryers.

Control Interface Board . . . . . Provides the output signal interface from cooking control, to regulate heating and basket lift(s) operation (if equipped). The board components consist of a heat control Triac and two single pole N.O. relays.

Transformer . . . . . . Supplies 24VAC to the cooking control circuit. If equipped with basket lift(s)or filtering system, also supplies power for those control circuits. Transformer is energized when supply voltage is connected.

Power Switch . . . . . . Supplies power to control circuit.

High Limit Thermostat . . . . . . Prevents shortening from reaching temperatures over 460°F nominal (2nd high limit; manual reset @ 445˚F or below). Serves as a backup to the cooking control's high temperature alarm setting of 415˚F (1st high limit; normal operation resumes when temperature falls below this point).

Temperature Probe . . . . . . Senses temperature of shortening. Converts the temperature into a resistance valve which is monitored by the cooking control. The probe is an RTD (resistance temperature detector) of the Thermistor type. As temperature increases the resistance value decreases.

Drain Valve Interlock Switch (DVI) . . . . . . A magnetic reed switch (N.O.) mounted on the manual drain valve. When valve is closed, supplies a drain valve position signal to the cooking control. Prevents heating elements from being energized with the fry tank empty.

Tilt Switch . . . . . . A magnetic reed switch (N.O.) mounted underneath the element head assembly. Removes power from 1CON & 3CON to de-energize the heating elements when the elements are raised.

1CON, 3CON and 2CON, 4CON Contactors . . . . . . Supplies line voltage to heating elements.

Heating Elements . . . . . . Produces heat that is transferred to the shortening.

R1 Heat Relay . . . . . . Supplies power to 2CON and 4CON contactor coils.

R2 Power Relay . . . . . . Supplies power to cooking control.

KLEENSCREEN FILTER CONTROLS

Filter Power Switch . . . . . . Supplies 120VAC to pump motor. Filter valve switch or discard valve switch must be closed (valve handle extended).

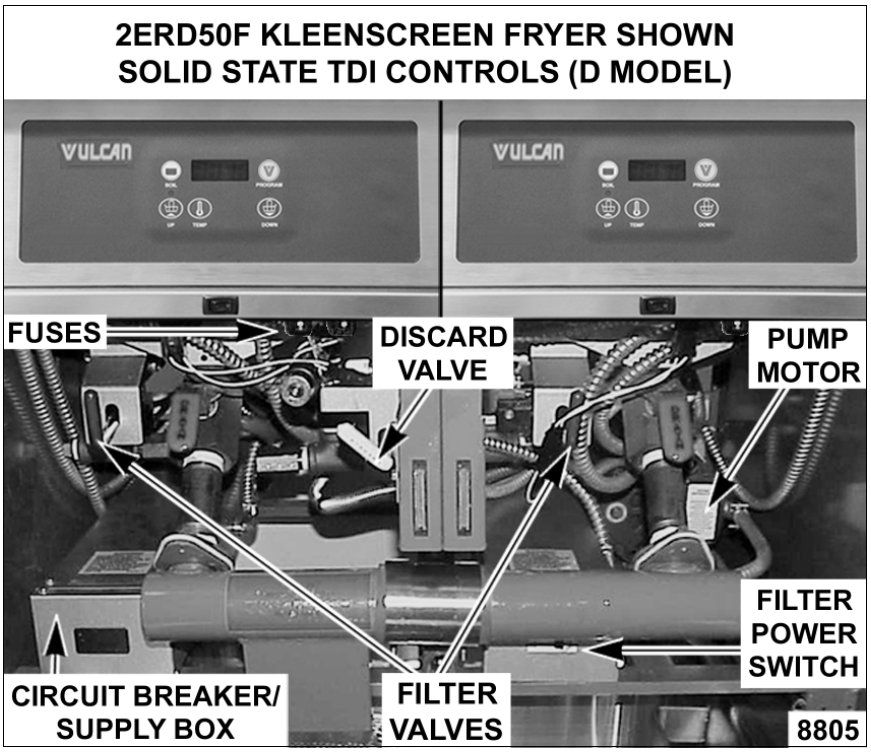
Pump Motor . . . . . . Operates pump to circulate shortening through filtering system. Thermal protector prevents motor from reaching excessive operating temperatures. If tripped, the protector can be manually reset when motor temperature is between 185˚F to 228˚F.

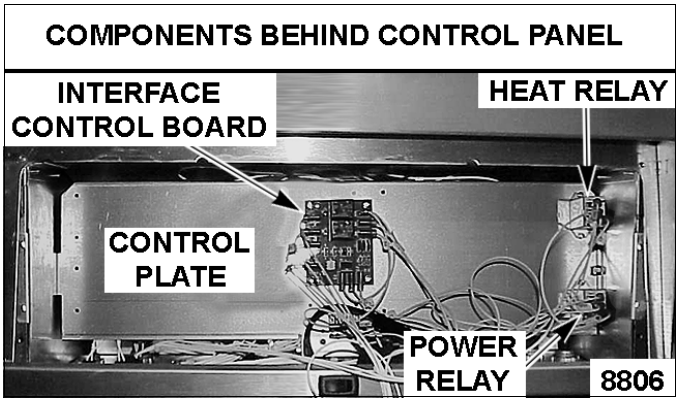
Filter Valve Switch . . . . . . Energizes pump motor to filter the shortening when switch is closed (valve handle extended). Filter power switch must be turned on.

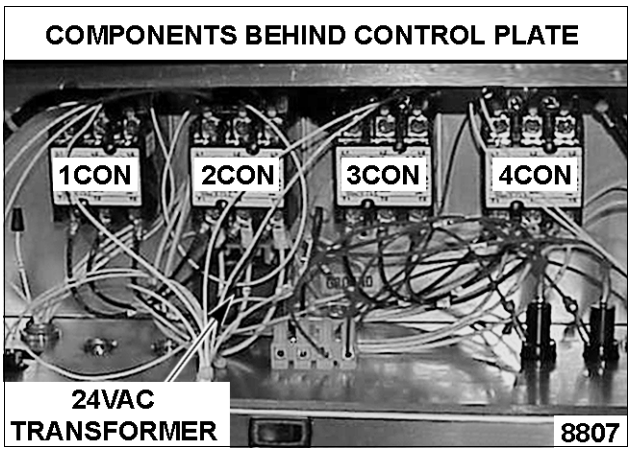
Discard Valve Switch . . . . . . Energizes pump motor to discard the shortening from filter tank when switch is closed (valve handle extended). Filter power switch must be turned on.

R3 Filter Relay . . . . . . Supplies power to pump motor.

COMPONENT LOCATION

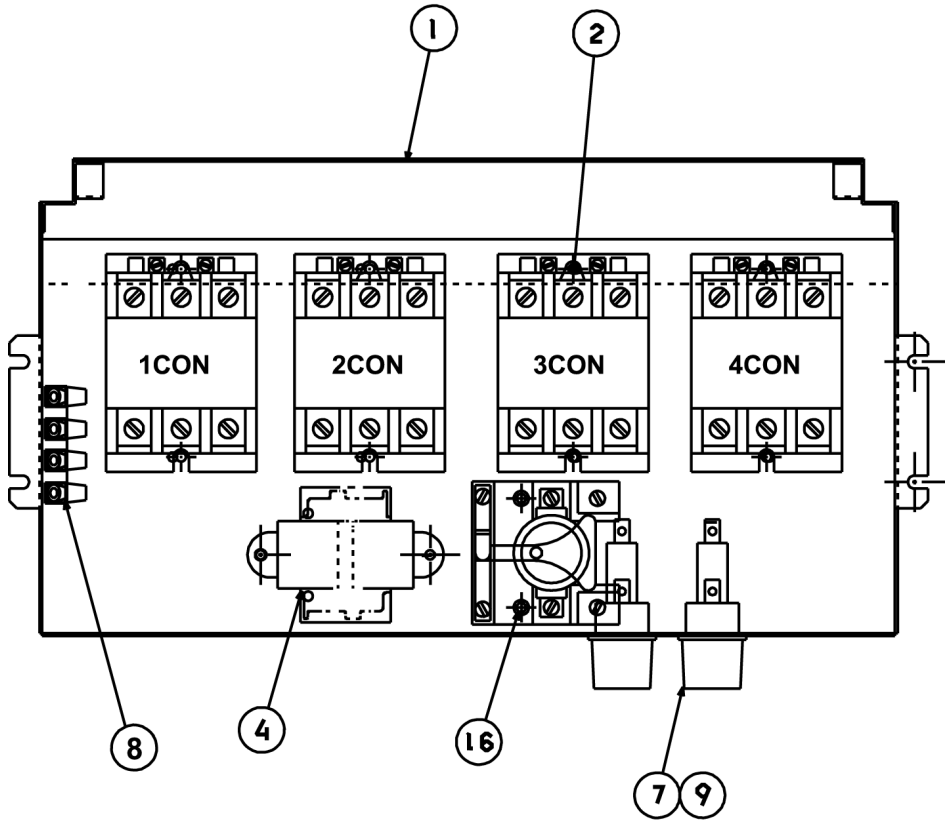






POWER SUPPLY BOX

POWER SUPPLY BOX



NOTE: BOX LOCATION IS BEHIND CONTROL PANEL AND INTERFACE BOARD PLATE.

ITEM	DESCRIPTION
16	RELAY, 24V SPDT (FILTERING SYSTEM ONLY)
9	HOLDER, FUSE
8	BLOCK, TERMINAL
7	FUSE
4	TRANSFORMER, 24VAC SECONDARY
2	CONTACTOR 3 POLE
1	BOX, POWER SUPPLY

AI1401

CIRCUIT BREAKER/SUPPLY BOX

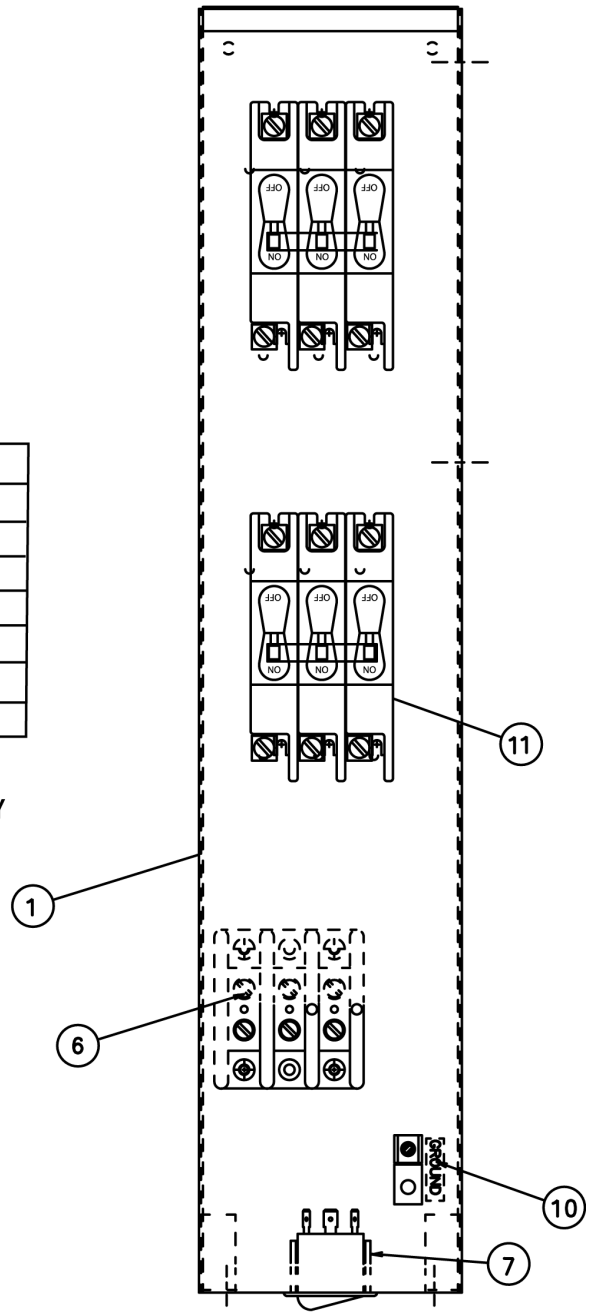
CIRCUIT BREAKER/SUPPLY BOX

ITEM	DESCRIPTION
*	GRIP, CORD **
*	CORD, POWER **
11	CIRCUIT BREAKER ***
10	LUG, GROUND
7	SWITCH, FILTER POWER **
6	BLOCK, 3 POLE TERMINAL
1	BOX, BREAKER

* REQUIRED, NOT SHOWN

** FILTERING SYSTEM & 480V FRYERS ONLY

*** 24KW FRYERS ONLY



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SEQUENCE OF OPERATION

Refer to schematic diagram 8810 for Cooking Control and Filtering System operation.

Cooking Control, Solid State or Computer

FRY CYCLE - LIQUID SHORTENING

If using solid shortening, the control should be programmed to use the solid shortening MELT CYCLE . During the MELT CYCLE, the control will cycle the heat on/off in short intervals. This will gradually heat and liquify the shortening until it reaches a temperature of 135˚F. Melt cycle default times are:

- Liquid L = 4 sec on, 11 sec off (default)
- Solid S = 2 sec on, 13 sec off
- No melt 0 = 100% on.

On solid state controls only, CY (cycle) will be displayed before shortening letter designation and zero represents none (no melt).

The control then resumes normal operation as described in this sequence.

1. Conditions.
   - A. Fryer connected to correct supply voltage and is properly grounded. Separate connections are required for each section of the battery.
   - B. Fryer connected to a separate 120VAC source for the pump motor and transformer. Required for all filtering system fryer batteries.
     1) 120/24VAC transformer energized.
   - C. Internal fryer circuit breakers ON.

   NOTE: 208 and 240VAC models at 24 KW only.
   - D. Power switch off.
   - E. Shortening at proper level in fry tank and below last set point temperature used.
   - F. Cooking control is setup properly and ready to use.
   - G. Manual drain valve closed (drain valve interlock switch N.O. is closed).
   - H. Tilt switch contacts closed (N.O. - held closed with heating elements lowered).
   - I. High limit thermostat closed.
2. Turn power switch on.
   - A. Supply voltage energizes:
     1) 1CON and 3CON thru high limit thermostat and tilt switch.
     2) R2 power relay coil and R2-2 N.O. contacts close.
3. Cooking control powered at pin C2-1 (24VAC) and is jumpered to pin 6 (heat status). The control initializes and performs a diagnostic self check.

   NOTE: If the control passes self check, then the outputs are energized and operation sequence continues. If control does <u>not</u> pass self test, the control will display the appropriate message for the problem, disable the keypad and the electronic alarm will sound continuously. Refer to SOLID STATE or COMPUTER CONTROL under TROUBLESHOOTING.
   - A. Cooking control evaluates the input from: Heat status at pin C2-6; Drain valve interlock at pin C2-5; And temperature probe at pins C2-3 and C2-4 (high & low).
   - B. If the inputs to the control are valid and the shortening temperature is below set point, the heat demand output (24VDC) at pin C2-8 is then activated and power is applied to P3 (heat demand control, Triac energized) on the control interface board.
     1) Heat output (24VAC) at P6 (heat demand Triac) is activated on the control interface board. R1 heat relay coil energized and R1-2 N.O. contacts close.
        a. 2CON and 4CON are energized and heating elements are powered.
4. Shortening reaches set temperature.
   - A. Cooking control de-activates the heat demand output (24VDC) at pin C2-8 and power is removed from P3 (heat demand control, Triac de-energized) on the control interface board. With power removed from P3, the heat output at P6 (heat demand Triac) is also removed.
     1) 2CON and 4CON are de-energized and power is removed from heating elements.
5. Cooking control cycles heat output on shortening temperature until power switch is turned off, heating elements are raised or a high limit condition occurs.

NOTE: Steps 5A and 5B discuss open high limits. For additional information on cooking control error messages, refer to SOLID STATE or COMPUTER CONTROL under TROUBLESHOOTING.

A. If shortening reaches 415°F or higher (1st high limit), the cooking control de-activates the heat demand and basket lift outputs, cooking timers are cancelled (if active), keypad is disabled, display indicates HI, and the electronic alarm will sound continuously.

Turn power switch off to silence the alarm. Normal operation resumes when temperature drops below 415˚F.

B. If shortening reaches 460°F, the high limit thermostat opens (2nd high limit), 1CON and 3CON are de-energized and power is removed from heating elements.

1) 1CON and 3CON remain de-energized until the shortening temperature drops below 415˚F, manual reset button is pressed and power switch is turned on.

Filtering System

The filter valve handle and the discard valve handle are connected to a mechanical valve and switch assembly to route the flow of shortening in the filtering system and supply power to the pump motor.

NOTE: The computer control contains a program feature that allows the operator to program a specific number of timed cooking cycles to complete then alert the operator to filter the shortening.

When the actual cooking count reaches the filter count setting, FILTER will flash in the right display when fryer is idle. Normal fryer operation continues without a cooking lockout. This feature can also be disabled.

Refer to Installation & Operation manual for specific instructions on filtering.

1. Conditions

A. Fryer connected to correct supply voltage and is properly grounded.

NOTE: Separate connections are required for the fryer controls and the filtering system controls.

B. Power switch to the fryer section off.

C. Shortening between 300˚F and 350˚F.

D. Filter drawer assembly installed properly.

E. Filter power switch off.

F. Filter valve handle (red) retracted.

1) Filter valve switch N.O. contacts open.

G. Discard valve handle (white) retracted.

1) Discard valve switch N.O. contacts open.

NOTE: On computer control fryer's, the control should be setup properly and ready to use.

2. Turn power switch on, to the fryer section to be filtered.

3. Set cooking control between 300˚F (minimum) and 350˚F (maximum).

NOTE: Shortening should not be filtered outside of this temperature range. At lower temperatures the shortening is thicker which may increase filtering time and place a greater load on the pump. At higher shortening temperatures, the pump seal life is decreased.

A. Allow shortening to cycle at set temperature for approximately 10 minutes.

NOTE: If using solid shortening, once it has melted, stir the shortening to eliminate any solid shortening in cold zone of the fry tank.

4. Solid State Control:

A. Turn power switch off, to the fryer section to be filtered.

B. Open the manual drain valve to the fryer section in need of filtering and drain the shortening into filter tank.

NOTE: If using solid shortening, allow hot shortening to stand in filter tank for approximately 6 minutes prior to filtering.

C. Turn filter power switch on.

1) Switch pilot light comes on.

D. Extend filter valve handle of the same fryer section.

1) Filter valve switch N.O. contacts close.

a. Power supplied to pump motor.

E. Pump motor circulates shortening through filter until power is removed.

F. When filtering process is completed, close the manual drain valve to the fryer section and allow the fry tank to refill.

G. When all filtered shortening is returned to the fryer, retract the filter valve handle.

1) Power is removed from pump motor.

H. Turn filter power switch off.

1) Switch pilot light goes out.

NOTE: If using solid shortening, when all filtered shortening is returned to the fry tank and filter power switch is off, open the filter drawer approximately one inch. Allow the remaining shortening in the line to drain into the filter tank to prevent possible clogging after the shortening cools and solidifies. Close the filter drawer when complete.

5. Computer Control:

   A. The number of cooking cycle's reach the filter count setting.

   B. The right side display indicates FILTER and will flash when the fryer is idle.

NOTE: A manual filter cycle can also be done at any time by following the procedure outlined under SOLID STATE CONTROL in steps 4B thru 4H. Display will show DRAINING TURN OFF. If desired, the filter timer can still be initiated.

   C. Open the manual drain valve to the fryer section in need of filtering and drain the shortening into filter tank.

   NOTE: If using solid shortening, allow hot shortening to stand in filter tank for approximately 6 minutes prior to filtering.

   NOTE: Drain valve interlock contacts open and the position of the drain valve is indicated to the cooking control.

   NOTE: Steps 5D thru 5G should be performed in immediate succession to start the filtering process and the filter timer.

   D. Turn filter power switch on.

      1) Switch pilot light comes on.

   E. Extend Filter valve handle of the same fryer section.

      1) Filter valve switch N.O. contacts close.

         a. Power supplied to pump motor.

   F. Pump motor circulates shortening through filter until power is removed.

   G. Press either TIME key to start filter timer countdown.

      1) FILTER and the remaining filter time are displayed.

   H. Filter time expires:

      1) FILTER DONE is displayed and the electronic alarm will sound for approximately 5 seconds. Display then changes to CLOSE DRAIN.

   I. Close the drain valve:

      1) TURN OFF is displayed.

NOTE: Closing the drain valve before filter time expires will stop the filter timer but will not reset the filter counts. The FILTER prompt can only be reset by completing a filtering cycle or disabling the function in programming mode. Cycling the power will not reset this prompt.

NOTE: Drain valve interlock contacts close and the position of the drain valve is indicated to the cooking control.

   J. When all filtered shortening is returned to the fryer, retract the filter valve handle.

      1) Power is removed from pump motor.

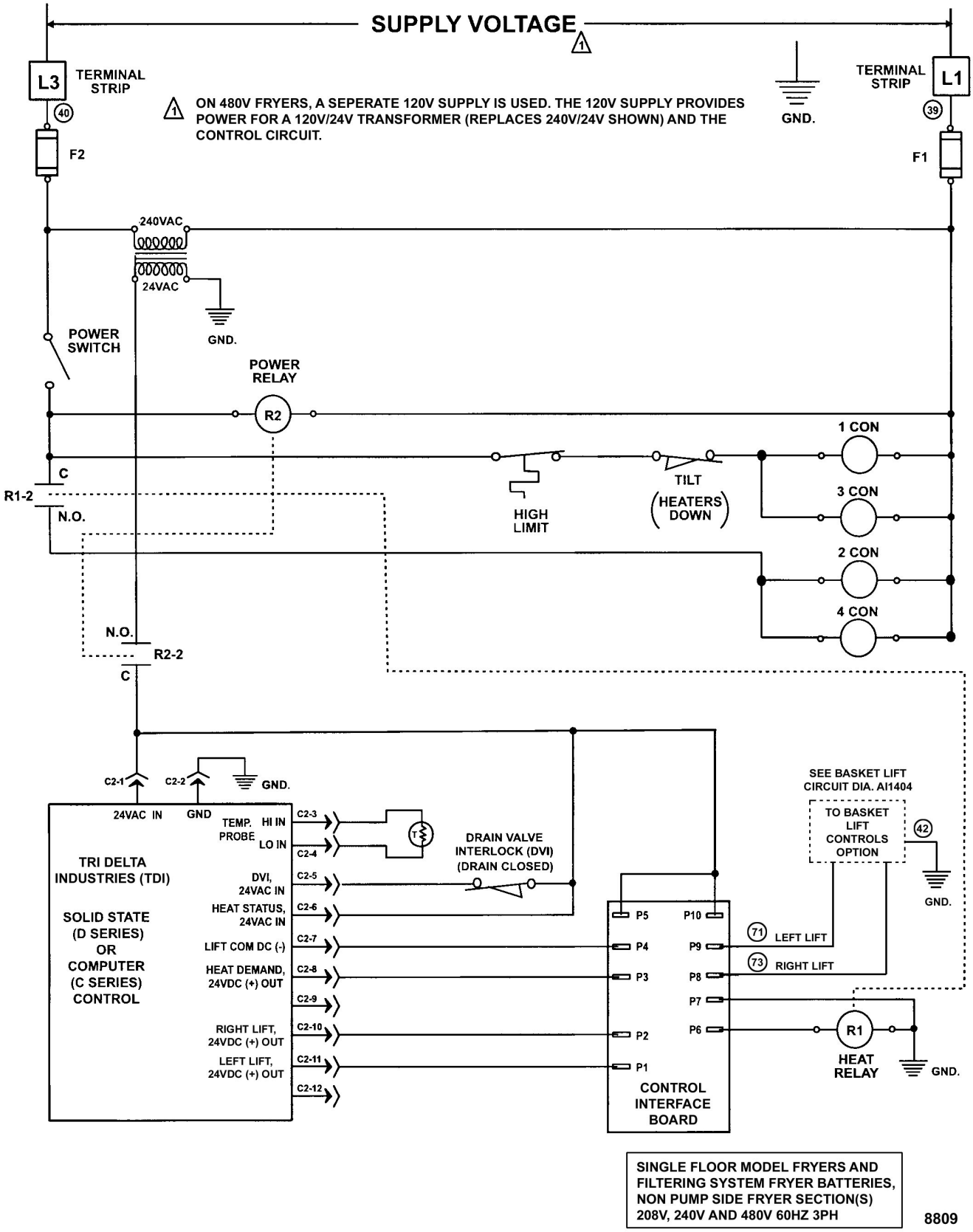
   K. Turn filter power switch off.

NOTE: If using solid shortening, when all filtered shortening is returned to the fry tank and filter power switch is off, open the filter drawer approximately one inch. Allow the remaining shortening in the line to drain into the filter tank to prevent possible clogging after the shortening cools and solidifies. Close the filter drawer when complete.

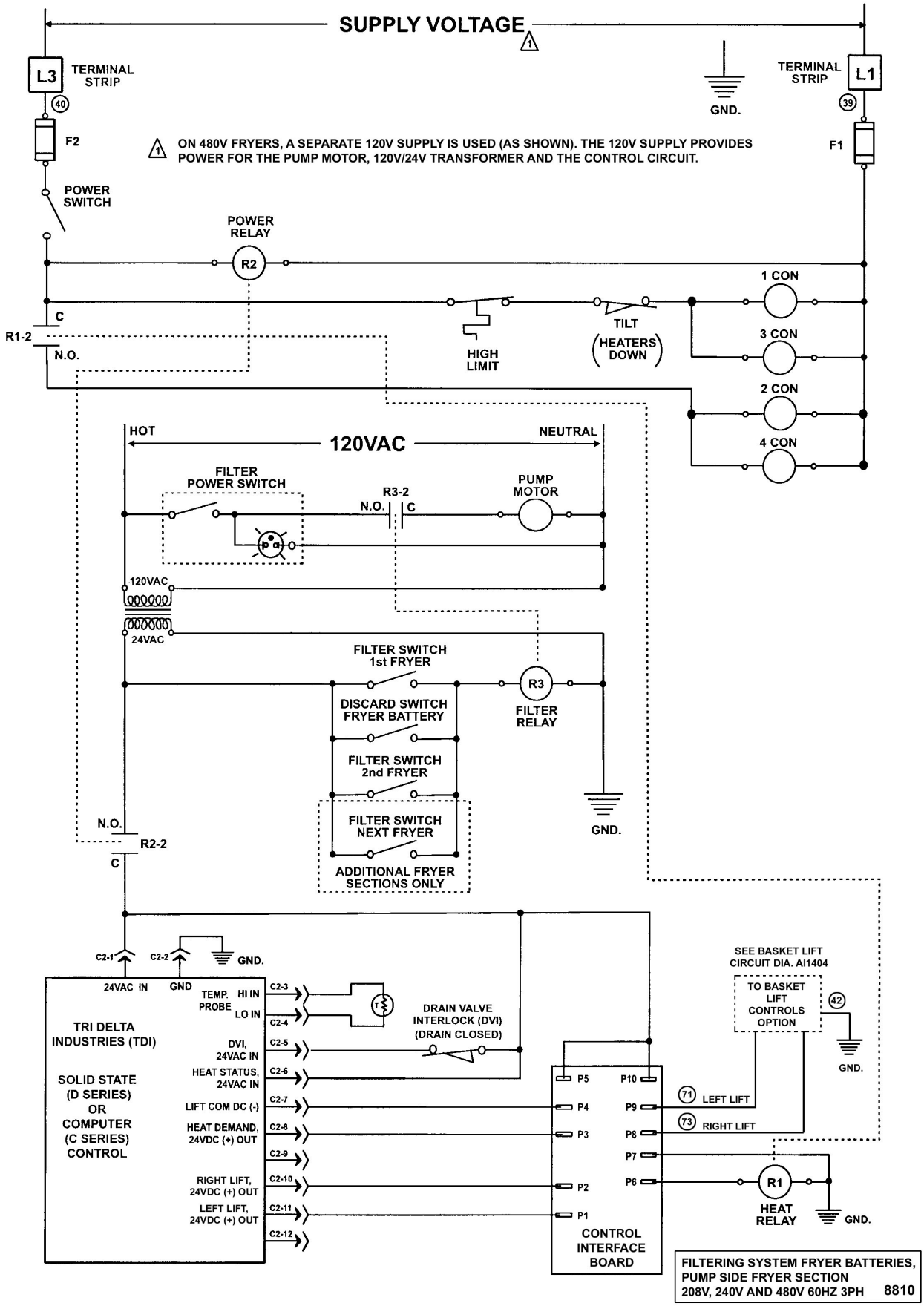
   L. Turn power switch off.

SCHEMATIC DIAGRAMS

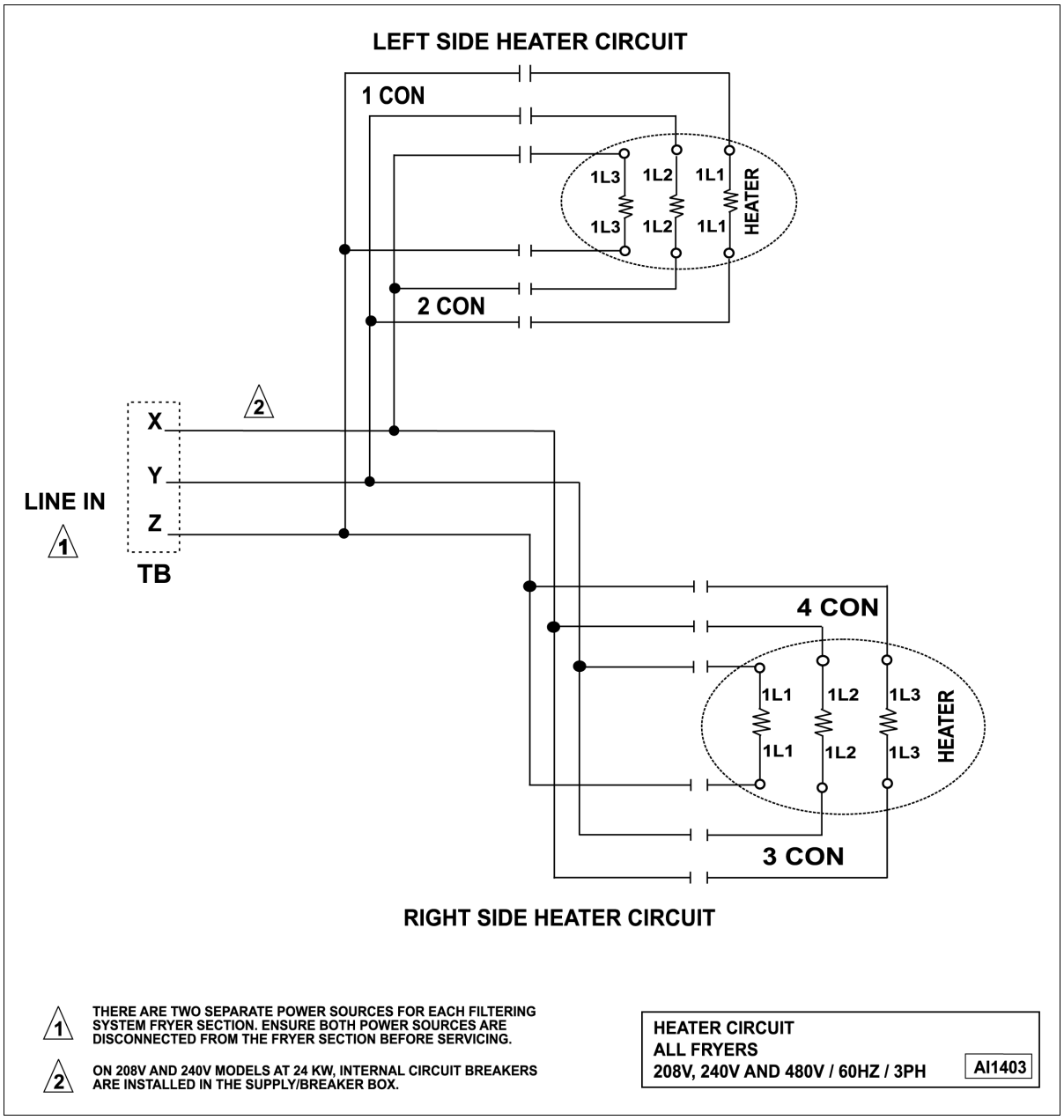
Single Floor Model Fryers & Filtering System Fryer Batteries, Non Pump Side Fryer Section(s)



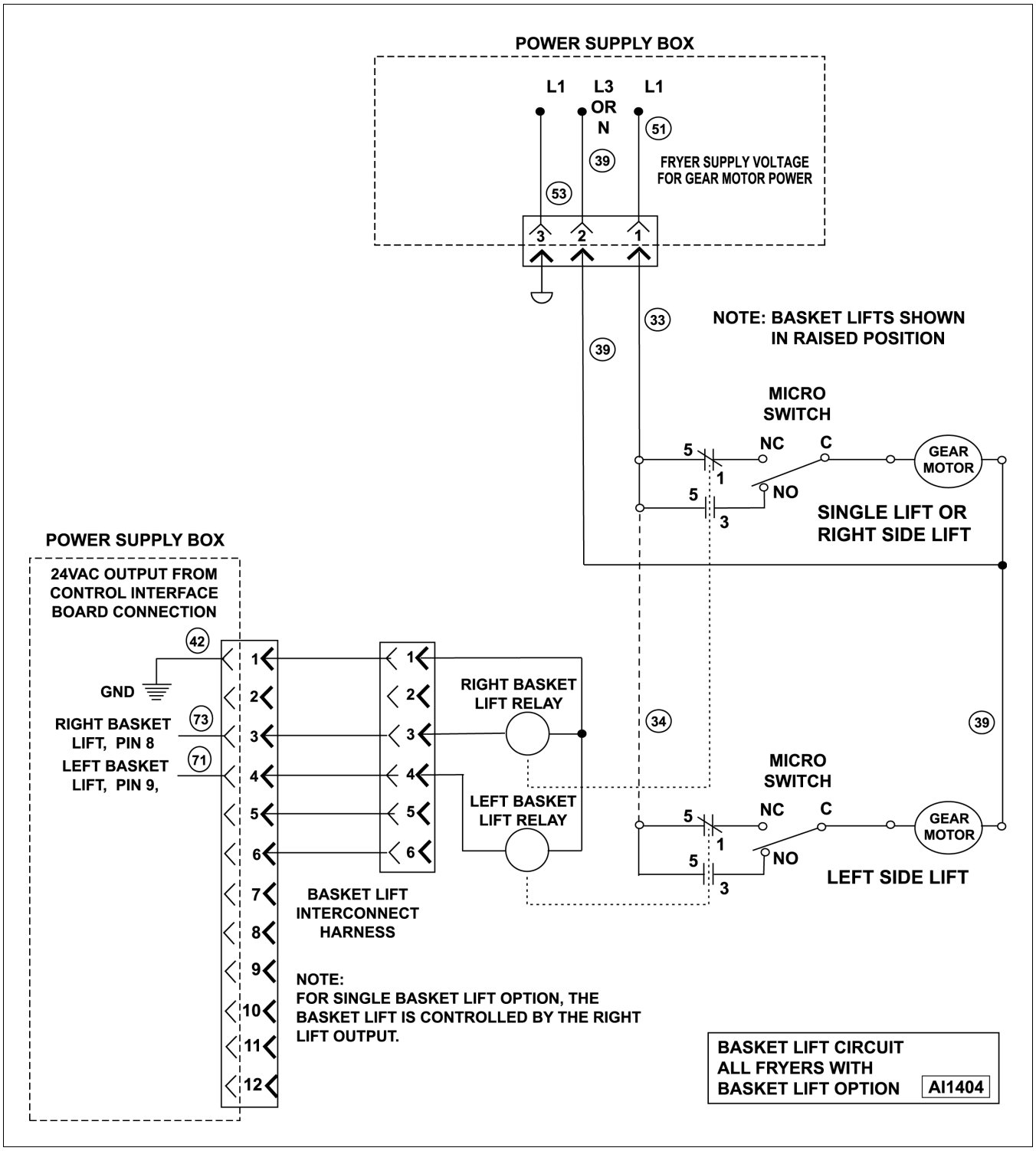
Filtering System Fryer Batteries, Pump Side Fryer Section



Heater Circuit



Basket Lift Circuit



WIRING DIAGRAMS

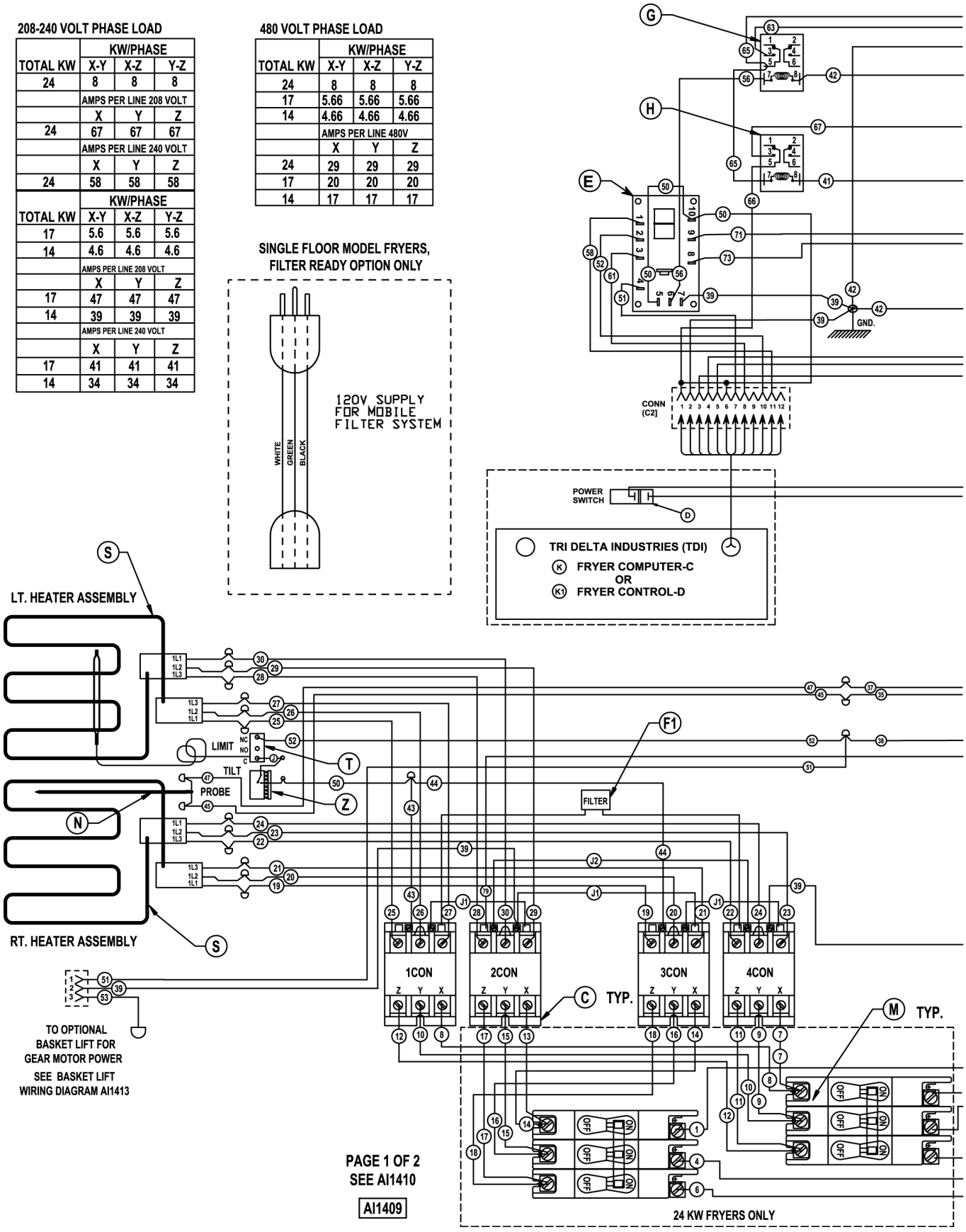
Single Floor Model Fryers & Filtering System Fryer Batteries, Non Pump Side Fryer Section(s)

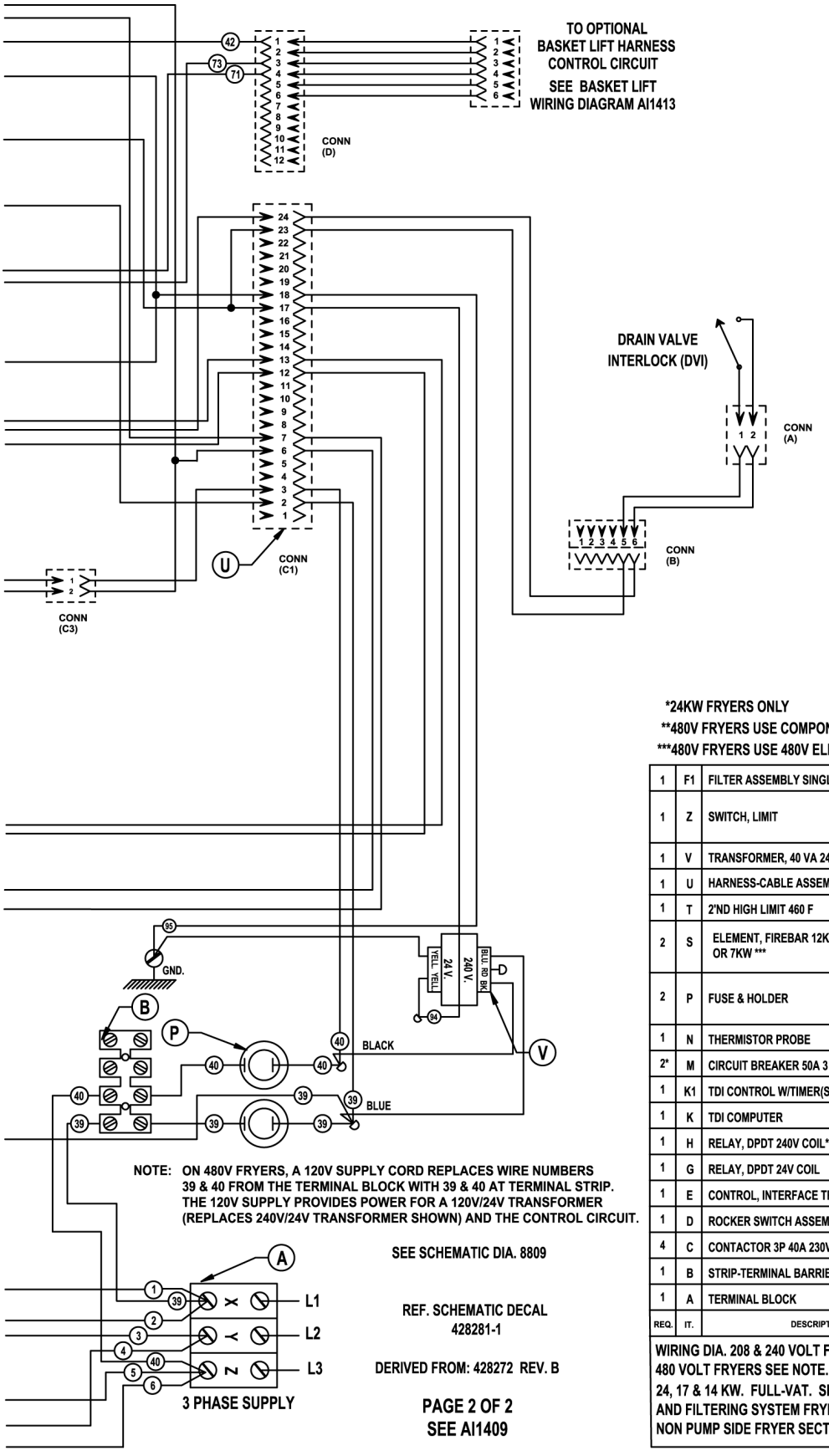
208-240 VOLT PHASE LOAD

	KW/PHASE		
TOTAL KW	X-Y	X-Z	Y-Z
24	8	8	8
	AMPS PER LINE 208 VOLT		
	X	Y	Z
24	67	67	67
	AMPS PER LINE 240 VOLT		
	X	Y	Z
24	58	58	58
	KW/PHASE		
TOTAL KW	X-Y	X-Z	Y-Z
17	5.6	5.6	5.6
14	4.6	4.6	4.6
	AMPS PER LINE 208 VOLT		
	X	Y	Z
17	47	47	47
14	39	39	39
	AMPS PER LINE 240 VOLT		
	X	Y	Z
17	41	41	41
14	34	34	34

480 VOLT PHASE LOAD

	KW/PHASE		
TOTAL KW	X-Y	X-Z	Y-Z
24	8	8	8
17	5.66	5.66	5.66
14	4.66	4.66	4.66
	AMPS PER LINE 480V		
	X	Y	Z
24	29	29	29
17	20	20	20
14	17	17	17





SEE SCHEMATIC DIA. 8809

REF. SCHEMATIC DECAL
428281-1

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PAGE 2 OF 2
SEE AI1409

*24KW FRYERS ONLY
**480V FRYERS USE COMPONENTS WITH 120V COILS.
***480V FRYERS USE 480V ELEMENTS.

REQ.	IT.	DESCRIPTION	FIN.
1	F1	FILTER ASSEMBLY SINGLE	-
1	Z	SWITCH, LIMIT	WIRED
			MAGNET
1	V	TRANSFORMER, 40 VA 240V/24V.	-
1	U	HARNESS-CABLE ASSEMBLY	-
1	T	2'ND HIGH LIMIT 460 F	-
2	S	ELEMENT, FIREBAR 12KW, 8.5KW OR 7KW ***	208 V.
			240 V.
2	P	FUSE & HOLDER	HOLDER
			FUSE
1	N	THERMISTOR PROBE	-
2*	M	CIRCUIT BREAKER 50A 3 POLE	-
1	K1	TDI CONTROL W/TIMER(S)	-
1	K	TDI COMPUTER	-
1	H	RELAY, DPDT 240V COIL**	-
1	G	RELAY, DPDT 24V COIL	-
1	E	CONTROL, INTERFACE TRIDELTA	-
1	D	ROCKER SWITCH ASSEMBLY	-
4	C	CONTACTOR 3P 40A 230V COIL**	-
1	B	STRIP-TERMINAL BARRIER	-
1	A	TERMINAL BLOCK	-

WIRING DIA. 208 & 240 VOLT FRYERS, TDI CONTROLS
480 VOLT FRYERS SEE NOTE.
24, 17 & 14 KW. FULL-VAT. SINGLE FLOOR MODEL FRYERS
AND FILTERING SYSTEM FRYER BATTERIES,
NON PUMP SIDE FRYER SECTION(S) **AI1410**

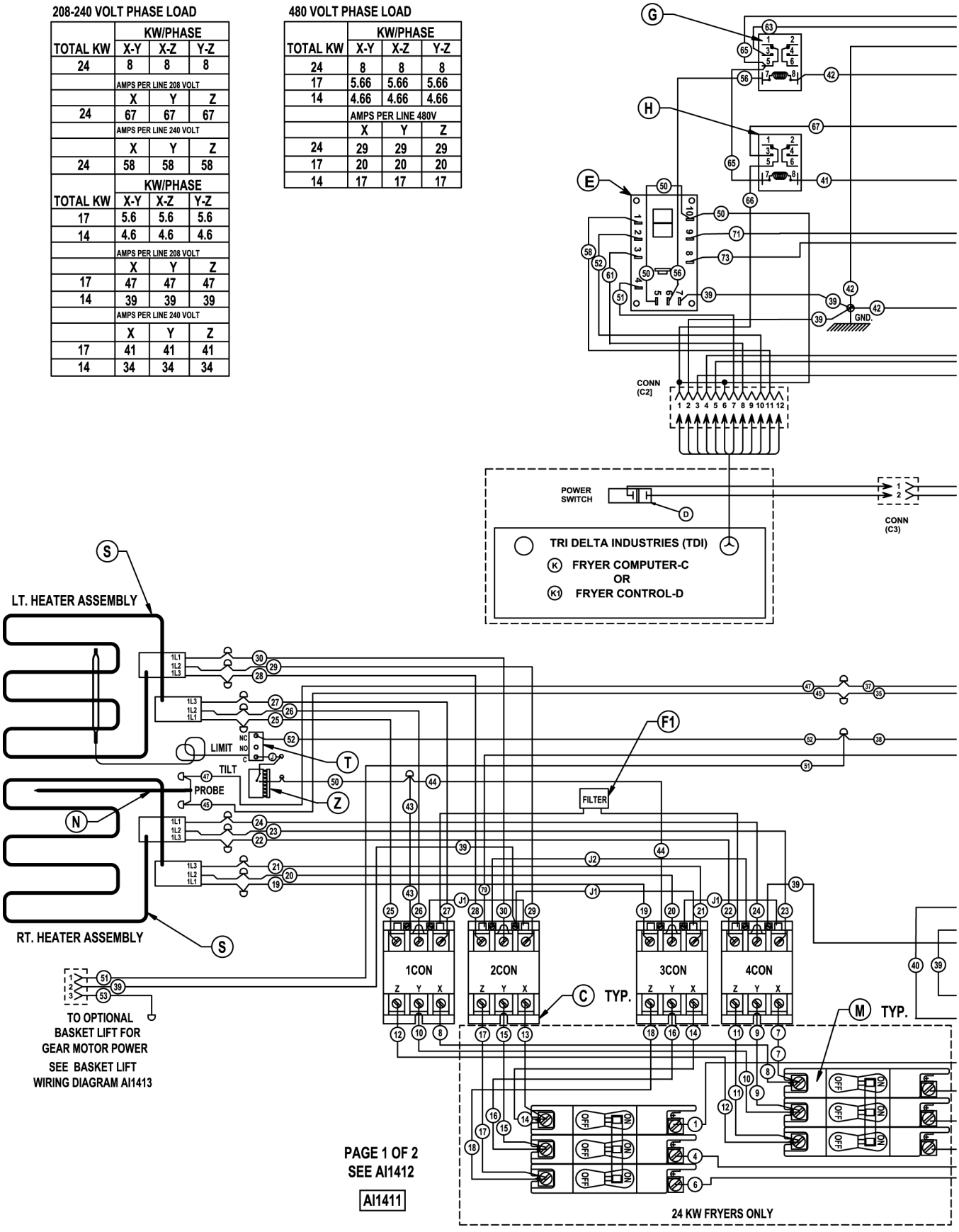
Filtering System Fryer Batteries, Pump Side Fryer Section

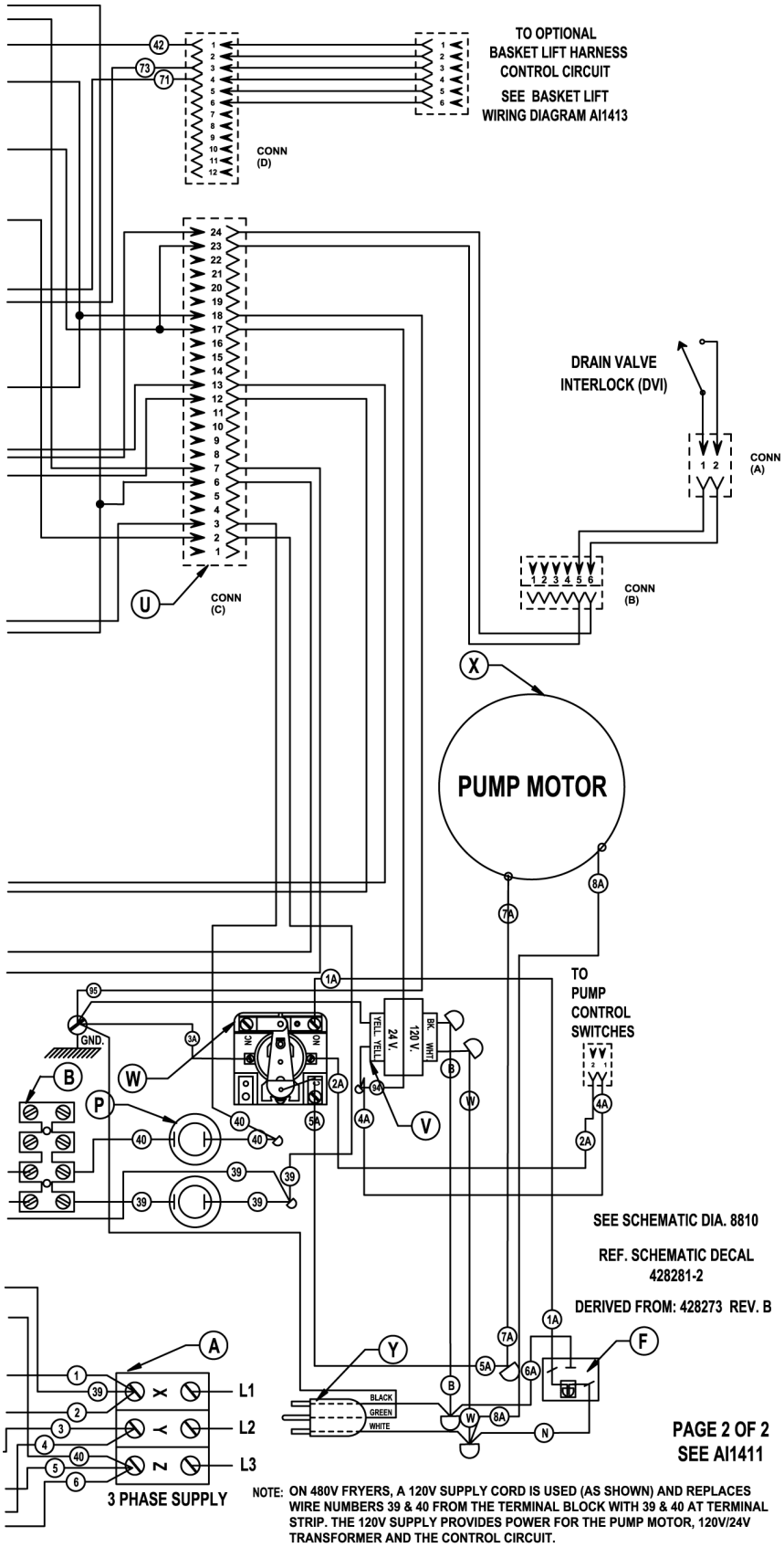
208-240 VOLT PHASE LOAD

	KW/PHASE		
TOTAL KW	X-Y	X-Z	Y-Z
24	8	8	8
	AMPS PER LINE 208 VOLT		
	X	Y	Z
24	67	67	67
	AMPS PER LINE 240 VOLT		
	X	Y	Z
24	58	58	58
	KW/PHASE		
TOTAL KW	X-Y	X-Z	Y-Z
17	5.6	5.6	5.6
14	4.6	4.6	4.6
	AMPS PER LINE 208 VOLT		
	X	Y	Z
17	47	47	47
14	39	39	39
	AMPS PER LINE 240 VOLT		
	X	Y	Z
17	41	41	41
14	34	34	34

480 VOLT PHASE LOAD

	KW/PHASE		
TOTAL KW	X-Y	X-Z	Y-Z
24	8	8	8
17	5.66	5.66	5.66
14	4.66	4.66	4.66
	AMPS PER LINE 480V		
	X	Y	Z
24	29	29	29
17	20	20	20
14	17	17	17





NOTE: ON 480V FRYERS, A 120V SUPPLY CORD IS USED (AS SHOWN) AND REPLACES WIRE NUMBERS 39 & 40 FROM THE TERMINAL BLOCK WITH 39 & 40 AT TERMINAL STRIP. THE 120V SUPPLY PROVIDES POWER FOR THE PUMP MOTOR, 120V/24V TRANSFORMER AND THE CONTROL CIRCUIT.

*24KW FRYERS ONLY

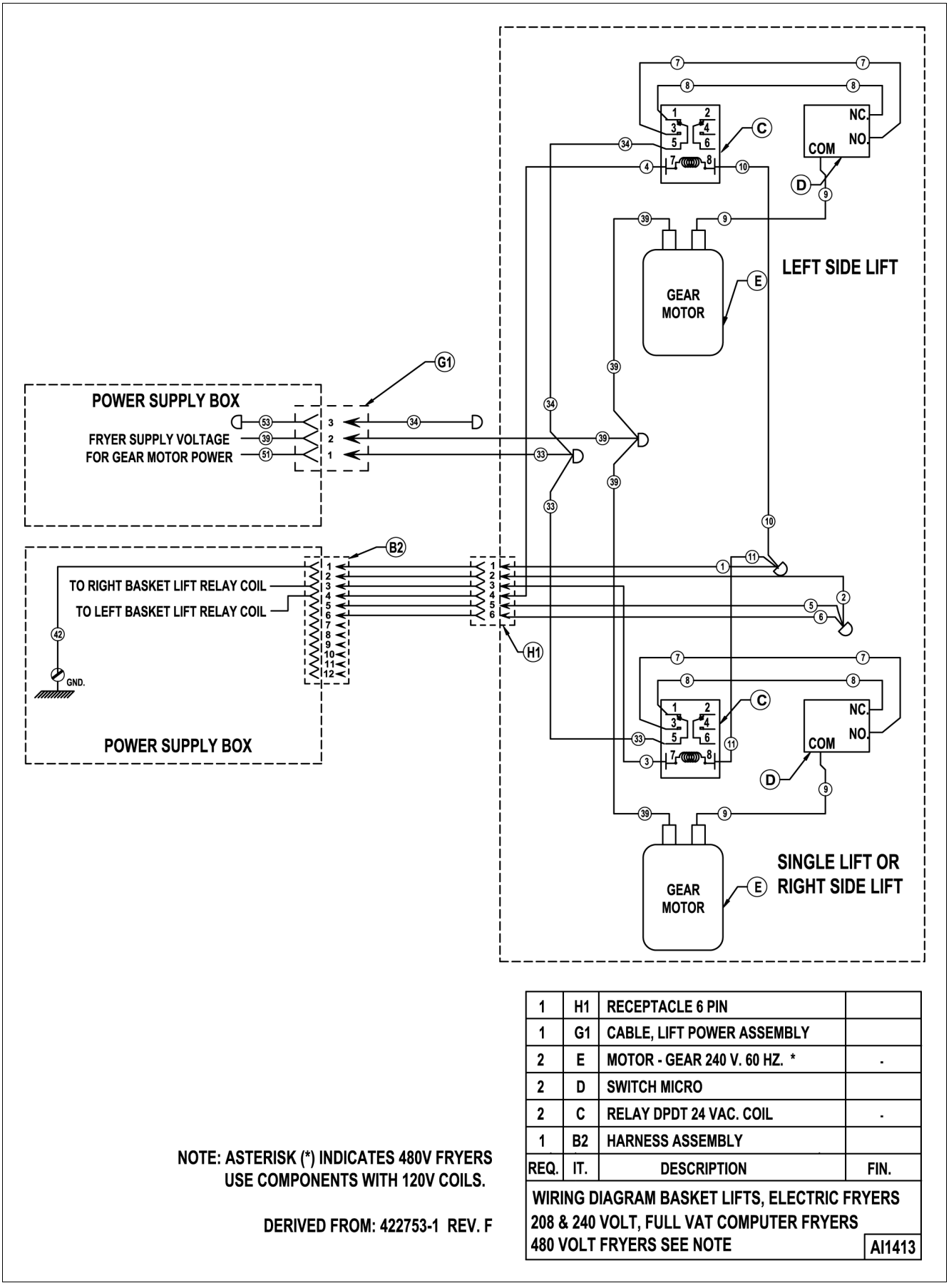
**480V FRYERS USE COMPONENTS WITH 120V COILS.

***480V FRYERS USE 480V ELEMENTS.

REQ.	IT.	DESCRIPTION	FIN.
1	F1	FILTER ASSEMBLY SINGLE	-
1	Z	SWITCH, LIMIT — WIRED	
		SWITCH, LIMIT — MAGNET	
1	Y	CORD, SUPPLY - FILTER	-
1	X	PUMP-MOTER KLEENSCREEN 120V.	-
1	W	RELAY, SPDT 24V. COIL	-
1	V	TRANSFORMER,40 VA 120V./24 V.	-
1	U	HARNESS-CABLE ASSEMBLY	-
1	T	2ND HIGH LIMIT 460 F	-
2	S	ELEMENT, FIREBAR 12KW, 8.5KW OR 7KW*** — 208 V.	
		ELEMENT, FIREBAR 12KW, 8.5KW OR 7KW*** — 240 V.	
2	P	FUSE & HOLDER — HOLDER	
		FUSE & HOLDER — FUSE	
1	N	THERMISTOR PROBE	-
2	M	CIRCUIT BREAKER 50A 3 POLE*	-
1	K1	TDI CONTROL W/TIMER(S)	-
1	K	TDI COMPUTER	-
1	H	RELAY, DPDT 240V COIL**	-
1	G	RELAY, DPDT 24V COIL	-
1	F	ROCKER SWITCH - LIGHTED	-
1	E	CONTROL, INTERFACE TRIDELTA	-
1	D	ROCKER SWITCH ASSEMBLY	-
4	C	CONTACTOR 3P 40A 230V COIL**	-
1	B	STRIP-TERMINAL BARRIER	-
1	A	TERMINAL BLOCK	-

WIRING DIA. 208 & 240 VOLT FRYERS, TDI CONTROLS
480 VOLT FRYERS SEE NOTE.
24, 17 & 14 KW. FULL-VAT. FILTERING SYSTEM FRYER BATTERIES, PUMP SIDE FRYER SECTION — AI1412

Basket Lift



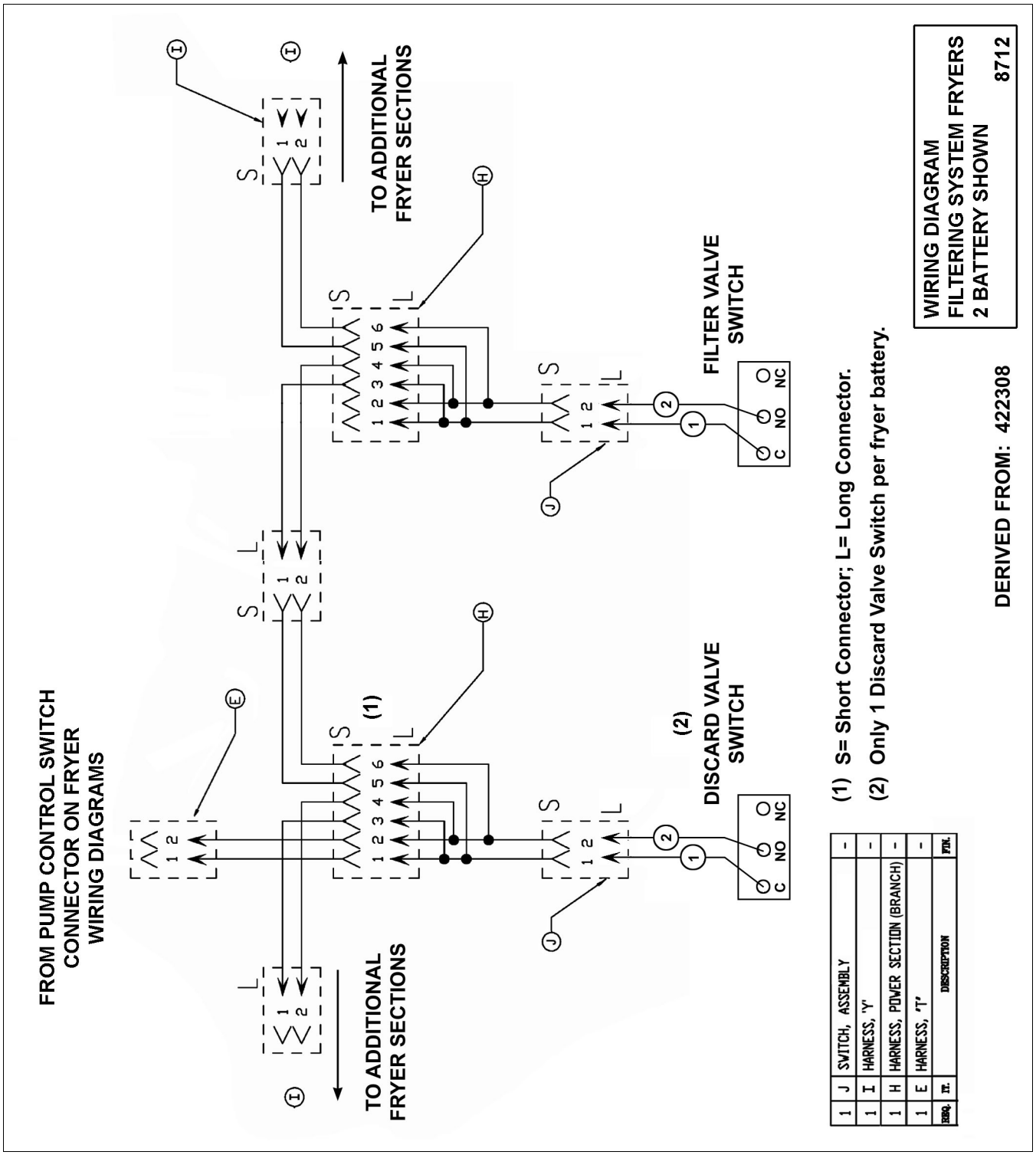
REQ.	IT.	DESCRIPTION	FIN.
1	H1	RECEPTACLE 6 PIN	
1	G1	CABLE, LIFT POWER ASSEMBLY	
2	E	MOTOR - GEAR 240 V. 60 HZ. *	-
2	D	SWITCH MICRO	
2	C	RELAY DPDT 24 VAC. COIL	-
1	B2	HARNESS ASSEMBLY	

WIRING DIAGRAM BASKET LIFTS, ELECTRIC FRYERS
208 & 240 VOLT, FULL VAT COMPUTER FRYERS
480 VOLT FRYERS SEE NOTE — AI1413

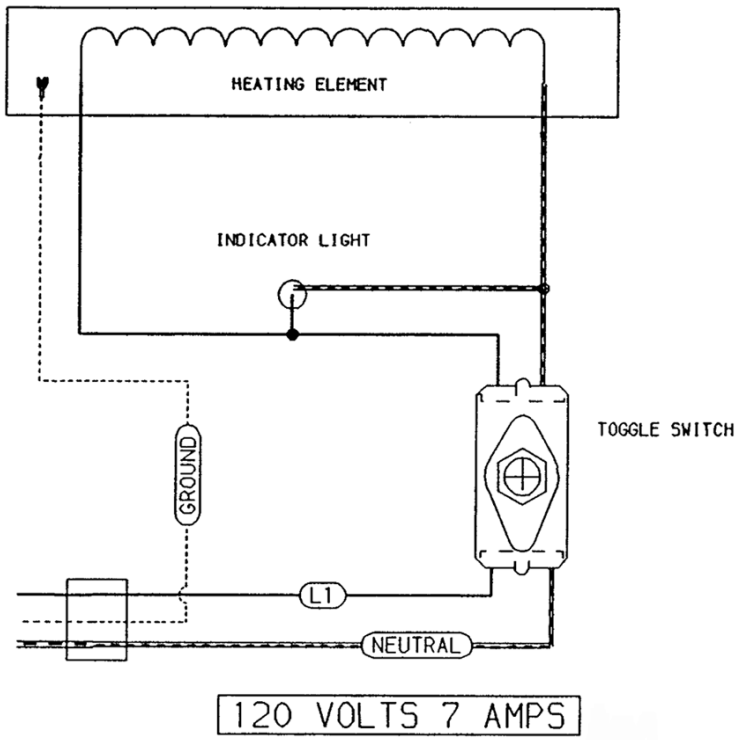
NOTE: ASTERISK (*) INDICATES 480V FRYERS
USE COMPONENTS WITH 120V COILS.

DERIVED FROM: 422753-1 REV. F

Filtering System Fryers, Filter/Discard Switch Connections



Frymate (Dump Station)



815

TROUBLESHOOTING

ALL MODELS

SYMPTOMS	POSSIBLE CAUSES
Fryer does not heat; Display lit.	1. Drain valve switch open (alarm message displayed); or switch malfunction. 2. Tilt switch covered with debris or malfunction (heating elements are lowered). 3. High limit thermostat open. 4. Contactor(s) malfunction. 5. R1 heat relay malfunction. 6. Interface board malfunction (no output from terminal P6). 7. Cooking control malfunction (no output from terminal C2-8). 8. Interconnecting wiring malfunction.
No power to cooking control, fryer does not heat.	1. Power switch off or malfunction. 2. Main circuit breaker off; If fryer is 24kw, internal circuit breaker off. 3. Transformer inoperative. 4. R2 power relay malfunction. 5. Interconnecting wiring malfunction.
Excessive time to melt solid shortening (more than 45 minutes).	1. Melt cycle timing incorrect. 2. Incorrect supply voltage. 3. Temperature probe malfunction. 4. Control malfunction.
Excessive or low heat.	1. Incorrect temperature offset selected. 2. Incorrect supply voltage. 3. Temperature probe malfunction. 4. Contactor(s) malfunction. 5. R1 heat relay malfunction. 6. Heating element malfunction (low heat). 7. Control Interface board malfunction. 8. Cooking control malfunction.
Intermittent problems.	1. High ambient temperatures. 2. Wiring connections loose or contaminated.

SOLID STATE CONTROL

The following alarms take precedence over any other controller mode or function (except drain valve open).

ALARMS	DESCRIPTION
OPEN PROBE	If an open probe is detected, the heat demand (heat on) and basket lift outputs are disabled. Any cooking in progress is cancelled and all operator buttons are disabled. The display shows Prob and the electronic alarm will sound continuously. **NOTE:** A temperature of less than 40˚F is an open probe equivalent.
SHORTED PROBE	If a shorted probe is detected, the heat demand (heat on) and basket lift outputs are disabled. Any cooking in progress is cancelled and all operator buttons are disabled. The display shows HI and the electronic alarm will sound continuously. **NOTE:** A temperature of 460˚F or greater is a shorted probe equivalent.
HI TEMPERATURE	If the temperature is greater than or equal to 415˚F, the heat demand (heat on) is disabled. Any cooking in progress is cancelled and all operator buttons are disabled. The display shows HI and the electronic alarm will sound continuously. Normal fryer operation resumes when the temperature drops below the high temperature alarm level.
DRAIN VALVE INTERLOCK (DVI)	When drain valve is opened, the DVI switch contacts open, and the 24VAC input to the controller is removed. The heat demand (heat on) and basket lift outputs are disabled. Any cooking in progress is cancelled and all operator buttons are disabled. The display will alternate between drn tUrn oFF for 3 seconds each in a continuos loop. When the drain valve is closed, the DVI switch contacts close, and the 24VAC input to the controller is restored. The heat demand (heat on) and all operator buttons will remain disabled; and the display will alternate between tUrn oFF for 3 seconds each in a continuos loop until power is cycled.

COMPUTER CONTROL

The following alarms take precedence over any other controller mode or function (except drain valve open).

ALARMS	DESCRIPTION
OPEN PROBE	If an open probe is detected, the heat demand (heat on) and basket lift outputs are disabled. Any cooking in progress is cancelled and all operator buttons are disabled. The display shows PROBE OPEN and the electronic alarm will sound continuously. **NOTE**: A temperature of less than 40˚F is an open probe equivalent.
SHORTED PROBE	If a shorted probe is detected, the heat demand (heat on) and basket lift outputs are disabled. Any cooking in progress is cancelled and all operator buttons are disabled. The display shows PROBE SHORT and the electronic alarm will sound continuously. **NOTE**: A temperature of 460˚F or greater is a shorted probe equivalent.
HI TEMPERATURE	If the temperature is greater than or equal to 415˚F, the heat demand (heat on) is disabled. Any cooking in progress is cancelled and all operator buttons are disabled. The display shows HI TMP and the electronic alarm will sound continuously. Normal fryer operation resumes when the temperature drops below the high temperature alarm level.
DRAIN VALVE INTERLOCK (DVI)	When drain valve is opened, the DVI switch contacts open, and the 24VAC input to the controller is removed. The heat demand (heat on) and basket lift outputs are disabled. Any cooking in progress is cancelled and all operator buttons are disabled. The display will show DRAINING TURN OFF. If the filter prompt is active, DRAINING FILTER is displayed; if the dispose prompt is active, DRAINING DISPOSE is displayed. When the drain valve is closed, the DVI switch contacts close, and the 24VAC input to the controller is restored. The heat demand (heat on) and all operator buttons will remain disabled; and the display will show TURN OFF until power is cycled.

SOLID STATE OR COMPUTER CONTROL HARNESS PIN-OUTS

PIN NO.	INPUTS	PIN NO.	OUTPUTS [3]
C2-1	24VAC Hot	C2-8	24VDC (+) Heat Demand
C2-2	24VAC Neutral [1]	C2-9	Not used at this time [2]
C2-3	Probe High (red)	C2-10	24VDC (+) Right Basket Lift
C2-4	Probe Low (white)	C2-11	24VDC (+) Left Basket Lift
C2-5	Drain Valve Interlock (24VAC) N.O.	C2-12	No connection
C2-6	Heat Status (24VAC)	---	---
C2-7	Lift Relay DC (-) Common	---	---

NOTES: 1. Connected to ground internally. 2. Available for external buzzer output (24VDC).
3. Outputs to Control Interface Board.

CONTROL INTERFACE BOARD PIN-OUTS

PIN NO.	INPUTS	PIN NO.	OUTPUTS
P1	24VDC (+) Left Basket Lift	P6	Heat Demand, Triac (24VAC) [2]
P2	24VDC (+) Right Basket Lift	P7	System Ground
P3	24VDC (+) Heat Demand Control, Triac	P8	24VAC Right Basket Lift [3]
P4	Lift Relay DC (-) Common	P9	24VAC Left Basket Lift [3]
P5	Heat Demand, Triac (24VAC)	---	---
P10	Relay Contacts Common (24VAC) [1]	---	---

NOTES: 1. Relays connected internally. 2. To R1 heat relay coil.
3. To basket lift relay coil.

FRYMATE (DUMP STATION) WITH OPTIONAL HEATER

SYMPTOM	POSSIBLE CAUSES
No heat.	1. Unplugged. 2. Power switch off or inoperative. 3. Main circuit breaker off or open. 4. Malfunctioning heat assembly.

KLEENSCREEN FILTERING SYSTEM

SYMPTOM	POSSIBLE CAUSES
Shortening not filtering, pump motor is on.	1. Filter screen plugged. 2. Clog in filter system lines. **NOTE:** If using solid shortening, when all filtered shortening is returned to the fry tank and filter power switch is off, open the filter drawer approximately one inch. Allow the remaining shortening in the line to drain into the filter tank to prevent possible clogging after the shortening cools and solidifies. Close the filter drawer when complete. 3. Shortening below 300˚F (to thick). 4. Filter valve switch malfunction. 5. Filter valve mechanical malfunction. 6. Pump is inoperative.
Shortening not discarding, pump motor on.	1. Filter screen plugged. 2. Clog in filter system lines. **NOTE:** If using solid shortening, when all filtered shortening is returned to the fry tank and filter power switch is off, open the filter drawer approximately one inch. Allow the remaining shortening in the line to drain into the filter tank to prevent possible clogging after the shortening cools and solidifies. Close the filter drawer when complete. 3. Shortening below 300˚F (to thick). 4. Discard valve switch malfunction. 5. Discard valve mechanical malfunction. 6. Discard hose connection not fully engaged. 7. Pump is inoperative.
Pump motor is not running.	1. Filter power switch inoperative. 2. Filter/discard handle not extended. 3. Filter/discard valve switch malfunction. 4. Filter relay malfunction. 5. Pump motor limit tripped (manual re-set). 6. Pump motor inoperative.

- NOTES -

- NOTES -

- NOTES -

CONDENSED SPARE PARTS LIST

ER SERIES ELECTRIC FRYERS WITH TDI CONTROLS		
Part Number	**Description**	**Notes**
414146-2	High Limit Thermostat	
422737-1	Thermistor Probe-Temperature	
427759-1	Interface Board	
426805-G1	Reed Switch- Wired	
426801-2	Magnet-Reed Switch	
411500-13	Transformer 240/24 40 VA	
FE-023-55	Fuse Holder	
FE-019-40	Fuse 15 Amp	
411501-21	Circuit Breaker 50 Amp	
416535-7	Relay, 240v	
416535-4	Relay, 24V	
416535-6	Relay, 120v	
427755-G1	Rocker Switch	
411497-C5	Contactor 40 Amp 230v	
411497-C3	Contactor 40 Amp 120v	
421892-G1	Element 208v 12KW	
421892-G3	Element 240v 12KW	
416741-G9	Element 208v 8.5KW	
416741-G11	Element 240v 8.5KW	
416741-G5	Element 208v 7KW	
416741-G7	Element 240v 7KW	
421892-G4	Element 480v, 12KW	
416741-G12	Element 480v, 8.5KW	
416741-G8	Element 480v, 7KW	
411500-12	Transformer 120/28 40 VA	
411500-13	Transformer 208-240/28 40VA	
427757-1	Controller TDI D Series	
427758-1	Controller TDI C Series	
427820-1	Overlay, Controller TDI D Series	
426732-1	Overlay, Controller TDI C Series	
411497-A3	Relay 24v	
417792-1	Pump & Motor, Filter 120v	
411496-B4	Rocker Switch, Lighted (Filter)	
411496-F7	Micro Switch (oil return valves)	